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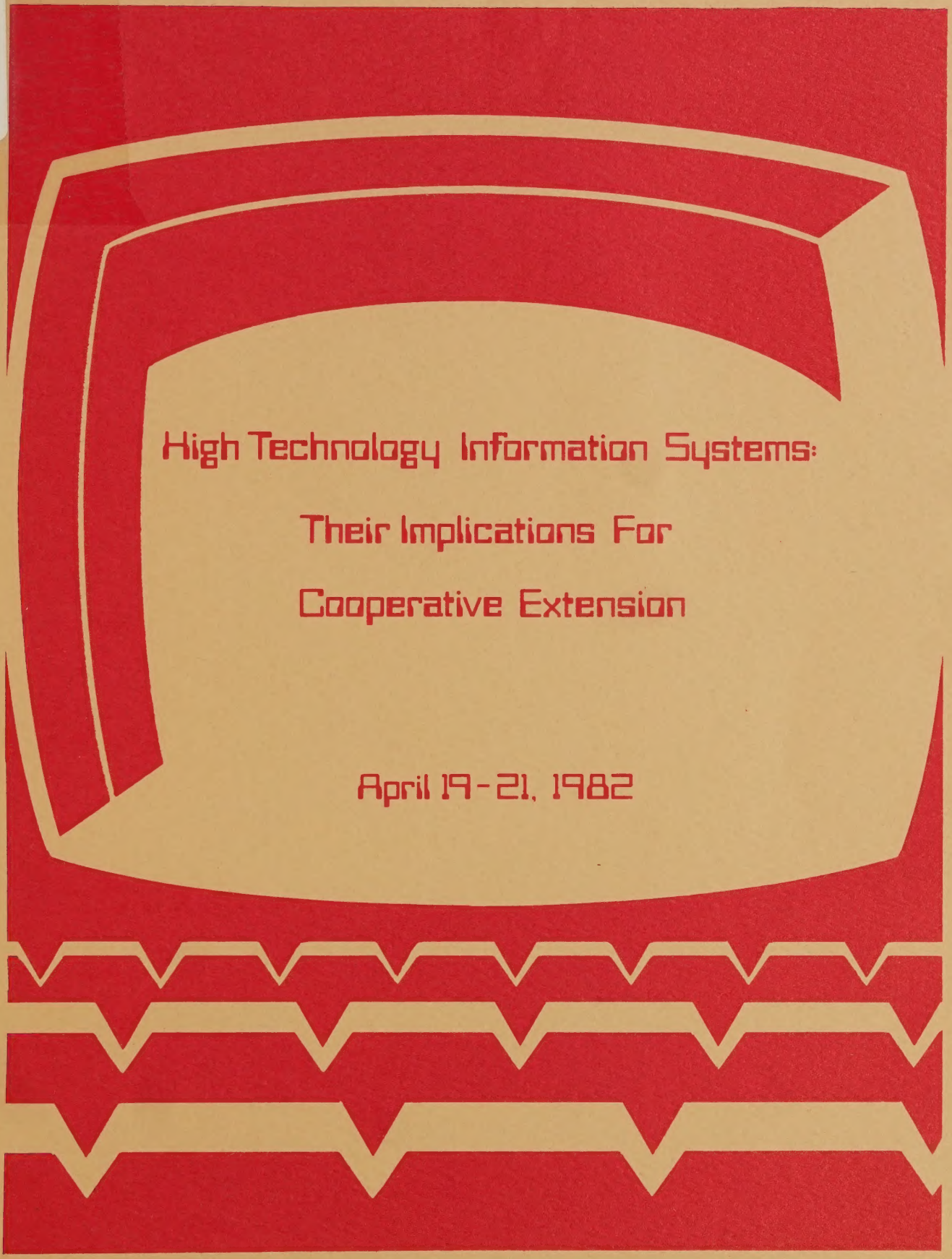

High Technology Information Systems: Their Implications For Cooperative Extension

April 19-21, 1982

Cooperative Extension Service, University of Connecticut, University of Delaware, University of the District of Columbia, University of Maine, University of Maryland, University of Massachusetts, University of New Hampshire, University of New Jersey, University of New York, University of Rhode Island, University of Vermont, United States Department of Agriculture and County Extension Services cooperating

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Issued by the Cooperative Extension Service in furtherance of the Acts of May 8 and June 30, 1914; the United States Department of Agriculture and the following Extension Services cooperating. E.J. Kersting, Director, Cooperative Extension Service, University of Connecticut at Storrs; S.M. Gwinn, Director, Cooperative Extension Service, University of Delaware; T.K. Page, Director, Cooperative Extension Service, University of the District of Columbia; Harold McNeill, Director, Cooperative Extension Service, University of Maine; Craig Oliver, Director, Cooperative Extension Service, University of Maryland; Daniel I. Padberg, Director, Cooperative Extension Service, University of Massachusetts; Maynard Heckel, Director, Cooperative Extension Service, University of New Hampshire; J.L. Gerwig, Director, Cooperative Extension Service, University of New Jersey; L.A. Noble, Director, Cooperative Extension Service, University of New York; G.A. Donovan, Director, Cooperative Extension Service, University of Rhode Island at Kingston; William Shimel, Director, Cooperative Extension Service, University of Vermont. The Cooperative Extension Service offers equal opportunity in programs and employment.

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The development of this conference, High Technology Information Systems: Their Implications For Cooperative Extension, grew out of an awareness by Northeast Cooperative Extension Directors and Administrators that information-related technology has become a significant element in Extension education. Perspective--relative to types of technological development, the speed of technological developments and the implications they have for Extension processes--is of great importance in making management decisions.

Based on this recognition and the willingness of the Farm Foundation, with W. K. Kellogg Foundation assistance, to fund this conference, it was planned and held on April 19-21, 1982. The Northeast Extension Directors and Administrators express gratitude for this financial support which allowed us to continue our professional growth and further our understanding of these technological developments.

The planning committee of Dr. Anne Rideout, CT; Dr. Charles Dvorak, RI; and Dr. William Shimel, VT; had the primary responsibility for developing the conference. Special recognition is given to Dr. Tom Tate, National Agricultural Library, for his advice and assistance.

Finally, it was the full participation of the program consultants, funding providers and participants in a free exchange of information and views that brought the program to its full success. It was not final answers that the conference sought, but perspective to make management decisions. This conference has made a major contribution in achieving that objective.

William A. Shimel, Chair
Conference Committee

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CATALOGING PREP

Seminar For Cooperative Extension Administrators

High Technology Information Systems:
Their Implications For Cooperative Extension

Participants	State
Anne Rideout	CT
Ted Kersting	CT
Richard Fowler	DE
Judith Bailey	DC
Craig Oliver	MD
Ralph Adkins	MD
Harold McNeill	ME
Richard Sanderson	ME
Margaret Randall	MA
Myra Lenburg	MA
Maynard Heckel	NH
Bonnie McGee	NH
Anne Sheelan	NJ
David Smith	NY
Carol Anderson	NY
William Shimel	VT
Robert Honnold	VT
Gerald Donovan	RI
Charles Dvorak	RI

Speakers	Location
Joseph Coates	Coates, Inc.
Tom Tate	National Agricultural Library
Harry Strong	Mitre Corp.
John Fox	University of California
Forrest Cress	University of California
Dan Moore	Pennsylvania State University
Dan Padberg	University of Massachusetts
Walt Armbruster	Farm Foundation
Jim Hildreth	Farm Foundation

Seminar for Cooperative Extension Administrators

High Technology Information Systems: Their Implications for Cooperative Extension

Sheraton Hotel, West Springfield, Massachusetts
April 19-21, 1982

Agenda

Welcome and Conference Objectives
Bill Shimel, Vermont - Moderator

Opening Session
"American Future(s); Where To By The 21st Century"
- Joseph F. Coates, President, I. F. Coates, Inc.
  Questions & Answers

Workshop - Conducted by Joseph F. Coates:
"What Future(s) Do We See?"

Dinner - Sponsored and Hosted by the Farm Foundation
and the W. K. Kellogg Foundation
"How Our Universities Will Meet Public Needs For the Future"
- Dan Padberg, Dean, University of Massachusetts

Anne Rideout, Connecticut - Moderator
"What Information Technology Will This Century See?"
- Harry Strong, the MITRE Corporation
  Questions & Answers

"New Information Technologies: Implications For Cooperative Extension"
- John R. Fox, Broadcast Services Coordinator
- Forrest D. Cress, Communications Specialist,
  Cooperative Extension, University of California
  Questions & Answers

Charles Dvorak, Rhode Island - Moderator
"The Cooperative Extension Service - Institutional Considerations Needed To Prepare For the 21st Century"
- Jim Hildreth, Managing Director, The Farm Foundation
  Questions & Answers
- Tom Tate, Systems Design, Program Analysis, National
  Agricultural Library, Beltsville, Maryland

Bill Shimel, Vermont - Moderator
Panel Discussion: "Knowing All Of This--What Should We Do?"
- Maynard Heckel, Director, Cooperative Extension,
  New Hampshire
- Dan Moore, Associate Professor, Rural Sociology, Kellogg
  Fellow, Pennsylvania State University

Joseph F. Coates is president of I. F. Coates, Inc., a futures research and policy organization in Washington, D.C.

Coates led a workshop about the future: helping participants focus on what the future of the Cooperative Extension Service would be like; and looking at how present and potential developments in information technology might affect the CES.

HIGH TECHNOLOGY INFORMATION SYSTEMS: THEIR IMPLICATIONS FOR COOPERATIVE EXTENSION

A Lecture and Workshop

by

Joseph F. Coates
J. F. Coates, Inc.
Washington, D. C.

The opening session consisted of four parts:

- A card exercise in which each participant was asked to fill out three cards, indicating on each one a major force or factor likely to influence the future of the extension system. The card and the response are shown in Exhibits 1 and 2.
- To give each participant a strong orientation toward the potential developments implicit in information technology, they spent eight minutes reading a futures scenario on how telecommunications intensitivity affect farm life. That scenario is Exhibit 3.
- A full presentation on forces and factors affecting the future of American society was given. This was a general lecture on long-term forces with strong emphasis on implications for the agricultural sector and extension system. It is outlined in Exhibit 4.
- The group was broken into three workshops which respectively dealt with--
  - -- a brainwriting exercise,
  - -- scenario building,
  - -- a nominal group process followed by a futures wheel exercise.

Each of the groups then reported back to the reassembled group. The purpose of the workshop exercises was to push the group to consider the implications for their organization, their activities, and their

responsibilities of changing information technologies and changing patterns in American society.

The process in each of the workshops is discussed in Exhibit 5.

Exhibit 1

The Trend Card

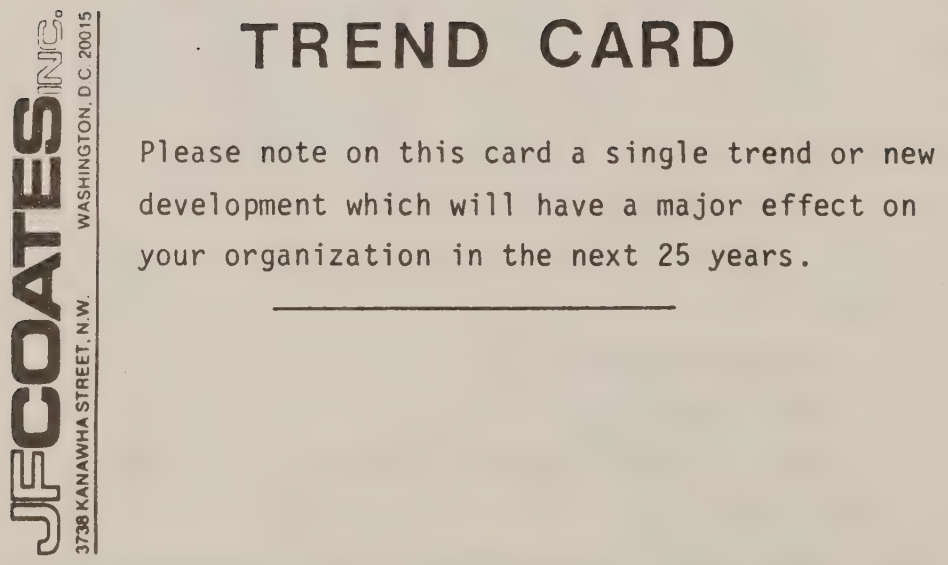

Exhibit 2

Results of the Trend Card Exercise

The 3 x 5 cards in Exhibit 1 were distributed to each participant. As an initial activity they were asked to fill out three of them. Fifty responses were received, and they broke out as follows:

Number of Responses	Topic
11	Computers
5	Other telematics technology
7	Fiscal constraints
3	Research and its use
4	Other technologies
5	Population, migration, aging, etc.
2	Extension and the land grant system
1	World food production
1	State control of higher education
1	Lifelong education
1	Specialization of knowledge
1	Political instability
1	The family farm and its decline
1	Energy
1	Water pollution
1	The family
1	Depletion of natural resources
1	Inflation
1	Retirement and academic tenure
1	Faculty and staff unions
Total 50	

Exhibit 3

The Scenario

The orientation scenario entitled, "The Storm," serves the purpose of presenting an integrated image of how intense telematics information technology may affect life on a future farm. By no means can one claim that this represents high probability or a fully realistic account of what the effects of such technology should be. The principal value of the scenario is as a provocation and implicit challenge to one's assumptions and as a mechanism for illustrating how one can usefully think about the intrusion of radically new technologies and other capabilities on presently existing system.

SCENARIO 1

The Storm

A loud buzzer woke Libby Collins early Thursday morning. An emergency message was coming onto the home terminal. Libby quickly ran through the possibilities:

-- Ann, their eldest daughter, was hurt, sick, or worse;

-- Tad, their son, had been in an accident coming home last night;

-- Mother needed help, medicine, or company;

-- There was a fire in the barn;

-- Someone was trying to steal the livestock;

-- A storm was coming;

-- The energy storage batteries were dangerously low;

-- Someone was fooling with the system, giving false alarms;

Putting on a robe, she went downstairs and read the message:

...Hailstorm rapidly approaching. Will hit Collins farm between noon and 4 P.M. ...

"Damn," Libby said to no one in particular, "Just when we were about to have the best sorghum harvest in years. I'd better wake John."

John slept through the alarm. He had only gotten a couple of hours sleep. He'd spent the night going over the financial arrangements for the proposed Mid-Nebraska Co-op Automated Elevator project. The elevator would be operated completely by robots and computers. It would reduce operating costs and improve efficiency for the co-op. With Clem Walker, the county extension agent, John had ironed out all the details for getting federal funding for the project through fiscal year 1995. They clearly qualified for funding under the Agricultural Robotics program -- the project was a significant change from past practice; it was technologically feasible and economically sound; it would pay back in less than five years, and the area needed the boost for family farms. There had been a growing

amount of large corporate acquisitions of family farms in the area. They could count on George Jackson, their Congressman, for the necessary political support. As finance chairman of the Co-op, John had had to get all of these details straightened out before the Co-op Executive Committee meeting that night.

John reacted to the news the same way as Libby had. "Just yesterday, the Weather Service assured me it wouldn't come this far south. I even tracked the damn thing myself using the data from the Co-op's receiving station. All my models told me the probability was miniscule -- less than 5%. When this all blows over, I'm getting some better modeling programs from the university."

"Wake up Tad and tell him to get on the videolink with the county locator and line up a crew for this morning. I heard there was a migrant harvesting group near here; tell them we'll pay double the going rate if they can get here in two hours. The transient locator service run by the county may be a good bet for picking up some extra people. I'll contact some members of the Co-op who aren't likely to be hit by the storm and see if we can borrow their harvesters. First, I'm going to run a few problems through the computer."

John was most interested in setting his priorities for harvesting. Which crops were most ready for harvest? The data from the automated irrigation sensors would give him some indication. Which crops would get the best price on the market? The local commodities trends and projections would give him that data. How much demand was there for biomass feedstocks and at what price? If the demand and price were right, the hail might not matter. Damaged sorghum was just as good as healthy sorghum as far as energy production was concerned.

Just as the priorities were coming off the console, Tad told him that the migrant crew was bound by a previous commitment to help the Jarrel farm.

The locator service provided the names of 20 possible people and their current whereabouts. Tad had contacted 15 of them on the videolink; 10 of them were willing to help out. Using the routing program on the home console, he laid out the fastest and most energy efficient means of getting these people to the farm. Three of them could hitch a ride with the Caravan; 2 others would come via the Medibus. The rest would form a temporary carpool and on the way would pick up the harvesters from the other members of the Co-op.

It was clear John was not going to get the whole crop in. The computer listed the priorities for harvesting:

Priorities for harvesting . . . . . .

1. Low pesticide residue crops...highest yield and price...maximum harvest time ½ hours with 3 harvesters.
2. Sorghum crop in section E-5...most ready for harvesting...harvest time 1 hour with 3 harvesters.
3. Sorghum crops in N-1, 2, and 3...high yield areas...relatively ripe for harvesting...harvest time 2 hours with 3 harvesters.
4. If time is available...S-2 and 3... harvest time 2 hours with 3 harvesters.
5. Remaining crops can be sold to Co-op for energy feedstocks; see if you can get commitment before the storm... estimate drop in price following the storm of $.50 per kilo of feedstock.

John's first response was to check the current prices for biomass feedstocks around the area. Hastings Co-op was paying top rate. However, Tom Broker down at the Co-op was not willing to pay that price today -- "in less than 12 hours we'll have more feedstock than we can handle." John brought Jack Holmes, president of the Co-op, into the negotiations. They quickly reached a compromise -- John would get half the difference between the price before the storm and after the storm. After terminating the negotiations, John ran through the various possible prices that could result after the storm. Even with the most severe storm, his profit from selling the sorghum as feedstock would be acceptable. With that knowledge, John could concentrate on the high yield, high quality areas instead of trying to get the most possible sorghum harvested. At 6 A.M. John, Tad, and the 15 men from the locator service left for the fields with three harvesters.

.....

Libby decided her time would be better spent: a) monitoring the farm, and b) doing some of her backlog of editing, typing, and programming work. They were going to need all the

extra income they could get if the storm was very severe. Libby had worked in town for a lawyer's office. When they got the home terminal, she decided it would be more economical to take in work than to make the 18 mile drive into town everyday. The law office found piece work convenient, less costly, and satisfying to all parties. They did not have to pay for office furniture, other overhead, and fringe benefits, and the work was done in pretty much the same amount of time.

In addition to her work for the law office, Libby also took in editing jobs from a local university -- there was always some professor in need of help in turning his tortured language into prose. She was also beginning to be known as a competent programmer. She had helped several of her friends with programming their home terminals and now some of the local businesses were hiring her. When the Collins got their terminal they had taken advantage of the salesman's offer of half-price tuition for programming courses. Within a year, Libby was bringing in money from programming. Before turning to her editing and programming, Libby ran a quick check on the farm's operations:

> The pigs were coming along nicely. The sensors embedded in their backs had worked beautifully in monitoring their heartrates, metabolism, and growth. The experiment with the Hans Seyle method of stress reduction and growth enhancement was working quite well. This year's slaughter would bring at least a 50% increase to this profit center of the farm.
>
> The cows had moved into the north pasture last night. The grass in the north pasture was not quite ready for grazing. Libby used the microwave prodder to move the cattle out of that pasture into the east pasture.
>
> The fence on the west pasture had a break. Libby's first suspicion was attempted rustling; reviewing the videotapes from last night's surveillance, she was unable to detect any smuggling; a count of the cattle moving from the north to the east pasture showed they were all there.

The wind generator and storage batteries were still low. The calm days of the past week had left much of the area without much energy stored in the batteries. Libby checked the load management network and saw a number of her neighbors in need

of immediate energy. Reviewing her probable needs for the next two days and estimating the amount of energy they would get from the hail storm, she decided they could spare some of their storage. She entered her offer and within 10 minutes was contacted by Len Jarrel, their neighbor. He thanked her for her offer and said he'd send over any of the migrant working crew he could spare to help John and Tad get the crop in.

Her final check was the experimental section where their crop breeding experiments were planted. Things did not look right -- the colors were off and the resolution of the zoom lens was fuzzy. Libby made a note to get a replacement monitor from town while she sent this one in to be fixed. Before turning away from the experimental section she activated the protective covering to prevent the hail from destroying their experiments.

.....

As Libby was checking on the farm, their youngest daughter Ellen came downstairs ready for school. Ellen's school, Hastings High School, was on an experimental program in which the students went to the central school only three days a week; the other two days were spent at home using interactive teaching programs on home computers. For those students whose homes did not have consoles, the school provided them for a nominal fee. Yesterday, Ellen had worked on her calculus, French, and history at home using the terminal. She also had begun her advanced course in computer repair -- a required part of the consumer education class.

After finishing her studies, Ellen had worked on several of the school paper stories; she was an editor on the paper:

Microwave Effects: Fatal to Farmers?

With the rapid proliferation of microwave dishes throughout our region some people have begun to wonder if we could be exposing ourselves to dangerous radiation. Most experts agree that a single device is not likely to be harmful. However, with the numerous devices cropping up in farms around the areas, we wonder if the interactive effects have been fully explored. This and related issues will be the main topic of discussion at this week's meeting of the Science Club in Room 404.

Energy/Telecommunications Conflict

There is a proposal to put a receiving antenna for the new solar power satellite in nearby Red Cloud, Nebraska. Some argue the microwaves from this giant energy satellite could adversely affect the communications networks in this area. In addition, if the satellite malfunctions, according to some it could harm people and animals in the surrounding area. The benefits of the satellite are a continuous supply of energy at relatively low operating costs. For the Red Cloud area it could mean more jobs and greater tax revenues.

Next month the debating club will focus on this conflict between energy, environment, and communications.

She put the stories on the school's computer network with messages to several of her fellow editors.

For entertainment, Ellen participated in an episode of "Space Invaders." Several of the kids at the local high school had formed a "Space Invaders" club; they played every Monday and Wednesday. After last night's episode, Ellen's starship fleet was minus two battle cruisers and in danger of being completely destroyed by her best friend's forces. Before retiring, Ellen tuned in the Cable TV to see the last half of the semi-finals of the women's pro-basketball championship. Her favorite team, the Iowa Marauders, had won and was well on its way to another championship.

Ellen had to fight with Tad to watch the game; he had wanted to use the viewer to participate in a junior grange meeting. They were preparing an agenda for the meeting of the Young Grange Party. Tad was hoping to be elected to represent Hastings. This would give him extensive exposure, as Grange party members from all over the nation would be participating. When Ellen had succeeded in capturing the viewer, Tad decided to use some of his remaining monthly gas allotment to take the car into town to be at the meeting. Before he left, he put in another plea for buying another viewer.

.....

Today, Ellen was going to Washington, D.C. Not really -- her travel club was trying to decide whether to go to Washington, D.C. or New York City over Christmas break. To help them decide, the school video library provided them with travel tapes. With these tapes, the club would experience

the sights, sounds, and smells of the places they could visit. She remembered the thrill of her first experience with the travel tapes -- as a thriller-diller extra the tape on San Francisco had ended with a jump off the Golden Gate Bridge.

After the travel club meeting Ellen and her friends in the Computing Club were meeting to discuss the alternative plans they had devised for improving the efficiency of the Caravan and the routine Medibus trips. Over the past two years, both the Caravan and the Medibus had exceeded their fuel allocation; the Co-op had offered the students a prize of 10 new game programs if they could come up with a more efficient routing system.

.....

When the price of gasoline went through the roof in 1985, the Hastings community decided to move to a less energy intensive/more communications intensive existence. Along with the local Co-op, the community government invested in a transmitting station and receiving disk. With these facilities they could offer the excess capacity as inducement to communications intensive firms that might want to locate in Hastings. Currently two companies -- an insurance company and a major mail order business -- were interested. Much of the program had been funded with lower interest loans backed up by the Rural Electrification Administration's "Wired Farm" program.

The most widely used element of the program was the twice a week Caravan -- a consolidated delivery and pickup service. The Caravan combined trash pickup, package delivery, and grocery/shopping deliveries into one service. Most of the community participated, significantly reducing the number of trips they made into town.

The community groups in Hastings also took advantage of the burgeoning communications capabilities. Using the facilities of the high school on its two vacant days they prepared and broadcast programs of interest to the community. To complement the broadcasts the community built a unique teleconferencing center. Using the home-to-center video relays and innovative video programming, community groups could hold face-to-face meetings without extensive travel. John Collins' presentation to the executive committee of the Co-op was going to use these facilities later that evening. Actual get-togethers were still common in Hastings -- especially on Sundays when people would

come into town for church, For church services, the interdenominational bus service brought people in from the surrounding countryside.

One of the most popular elements in the community communications' program was the Medibus. Libby's mother had been ill recently with the flu; the Medibus with its physician's assistant/driver had visited her mobile home several times during her illness to bring her drugs, check on her condition, and give her some company. While at the house, the assistant called in the current symptoms and put Libby's mother on the remote medical sensor. The doctor in town scanned the readout and ordered new prescriptions or instructions. At one point, Libby's mother had become so ill that they left a continuous monitoring device with her.

Libby's mother called Libby often during her illness, usually to complain about the physician's assistant; he was new to the area and didn't realize her stature in the community and the frailty of her health.

.....

After Ellen left for school, Libby called up the day's mail from computer storage. Sorting through the advertisements, Libby noted a sale on self-teaching programming cassettes. Getting on the video-link, Libby contacted Ivan Greenwald at the computer store in town; he had just one self-teaching cassette left. After debiting her account at Hastings National Bank, he agreed to send the program out on the next Caravan. Next, Libby contacted the John Deere outlet to get a new monitor for the experimental crop section. After paying a few bills, Libby turned to her personal correspondence.

After two months she had gotten a message from her computing comrade in Greece. Helena looked well; she'd gained a little weight but it looked good on her. The weather in Athens looked beautiful. Helena had just gotten back from a trip to the islands and had the tan to prove it. She apologized for not having been in contact sooner but life had been just one great whirlwind. After reviewing the comings and goings, births, deaths, marriages, divorces, and assorted peccadilloes of her family, she thanked Libby for her last communication. The English learning tape she had transmitted

would help her son Nikos brush up on his English before his visit to the United States next summer. Helena asked if it was still all right for Nikos to spend a few days with the Collins when he got to the U.S.

.....

While Libby was watching Helena's message, John activated the tractor's computercator to signal her. One of the harvesters had broken down and he needed some help from the local John Deere service center. Unfortunately, John had inadvertently misplaced the trouble shooter cassette.

Fortunately, John's harvester was equipped with the latest trouble sensors and a transmitter. Plugging in the code for the harvester, the technician saw immediately what was wrong with the harvester. He radioed John with step-by-step instructions for fixing the harvester. Within an hour of reaching Libby, John had the harvester working once again.

Around 1 P.M. the hail began. By 2 P.M. the ground was carpeted with hail. John, Tad, and the others had harvested more than they had expected. What was left of the crop would go for biomass feedstock. All in all they had responded much better than they would have a mere ten years earlier.

Exhibit 4

Outline

WHAT FUTURES DO WE SEE

The formal presentation on what futurists do consisted of a series of topical modules, first to orient the group toward thinking about the future, and second, to highlight the critical factors in futures thinking. The presentation is outlined below.

A. Orientation to futures thinking

- assumptions about the future;
- futures planning strategy;
- attitudes toward the future --
  - -- denial that the future involves potential for radical change,
  - -- a fortress mentality rejecting change implicit in accommodating to the future,
  - -- a proactive, positive or embracing view which makes the future work for you.

B. Critical factors in futures thinking

With the above as background we then turned to some key trend areas (see Exhibit 4a):

- Demographic change. Using the attached Exhibit 4b, the group was introduced to the concept of the demographic pyramid and how that changes. Critical factors discussed with regard to that were:
  - -- changing age distributions
  - -- changing fertility rates
  - -- entry level workforce
  - -- the impending oversupply of middle managers
  - -- the squaring of the pyramid with reduced birth rates and increased survival
  - -- the role of migration, immigration, and cultural change
  - -- the major effect of women's entry into the workforce, creating new degrees of independence, high discretionary income, lifestyle flexibility
  - -- single parent families
  - -- dual income families

Exhibit 4 (cont'd)

- The group was then introduced to the telecommunications/ telematics revolution. The items in Exhibit 4c were mentioned, but principal emphasis was given to the fact that the telematics revolution will change all aspects of the way we generate, handle, store, process, and use information. The implications of that were touched upon in terms of the capabilities of this technology to:
  - -- modify our view toward time, space, clock, and calendar;
  - -- widen participatory processes;
  - -- democratize the use of this equipment and things tied to it;
  - -- create new forms of systems integration;
  - -- raise problems of centralization and decentralization;
  - -- information control and ownership;
  - -- provide new degrees of autonomy or independence to individuals;
  - -- intrude upon the policy and political process.

The discussion then moved on to major social changes, including:

- the rise of the middle class with its characteristics of--
  - -- institutionalizing problems,
  - -- acting in a symbolic way, often to the detriment of true action,
  - -- being increasingly ignorant of how our technoeconomic system operates and therefore being susceptible to political extremism and the man-on-the-white-horse in the face of technological distress.
- the homogenization of society through the expansion of the middle class and associated values;
- the rise of entitlements;
- the role of bureaucracy as the central institution in our society. The irony was noted of its being the dominant institution and intrinsically conservative while at the same time, being the principal mediating mechanism to move us into the post-industrial society.

Other elements introduced into the discussion included:

- the post-industrial society;
- the internationalization of the American economy;
- the universal increase in the cost of energy.

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Exhibit 4a

LONG-TERM TRENDS FORMING THE BASIS FOR THE FUTURE*

A. GENERAL LONG-TERM SOCIETAL TRENDS

1. Economic prosperity, affluence, and inflation
2. Expanding education throughout society
3. Rise of knowledge industries and a knowledge-dependent society
4. Relative decline in common knowledge of the physical world
5. Urbanization/metropolitanization/suburbanization
6. Rise of the middle-class society
7. Cultural homogenization--the growth of a national society
8. Growth of permanent military establishment
9. Mobility, a) personal, b) physical, c) occupational, d) job
10. International affairs and national security as a major societal factor
11. Continuing immigration

B. TECHNOLOGY TRENDS

12. The centrality and increasing dominance of technology in the economy and society
13. Integration of the national economy
14. Integration of the national with the international economy
15. The growth of research and development as a factor in economy
16. High technological turnover rate
17. The development of mass media in telecommunications and printing
18. An awareness of the finitude of resources
19. Accommodation to energy price rise through new sources and conservation
20. Telematics--the expanding network of telecommunications and computer usage
21. Rise of biological and social sciences

C. TRENDS IN LABOR FORCE AND WORK

22. Specialization
23. Growth of the service sector
24. Relative decline of primary and secondary employment
25. Growth of information industries, movement toward an information society
26. Expansion of credentialism
27. Women, blacks, and other minority groups entering into the labor force
28. Early retirement
29. Unionism
30. Growth of pensions and pension funds
31. Movement toward second careers and mid-life change in career
32. Decline of the work ethic
33. National focus on productivity, international competition, and the health of American industry

D. TRENDS IN VALUES AND CONCERNS

34. General shift in societal values
35. Diversity as a growing, explicit value
36. Decline of traditional authority
37. The growth of anti-authoritarian movements
38. Increasing aspirations and expectations of success
39. Growth of tourism, vacationing, and travel
40. General expectations of high level of medical care
41. General expectations of high level of social service
42. The growth of consumerism
43. Growth of physical culture and personal health movements
44. Civil rights, civil liberties expansion for blacks, Chicanos, gays, and other minorities
45. Growth of women's liberation movement
46. Expanding entitlements
47. Increasing demands for the management of natural and man-made risks
48. Alienation and the feeling of powerlessness

E. FAMILY TRENDS

49. Decline in birth rates
50. Shifts in rates of family formation, marriage, divorce, and living styles
51. The growth of leisure
52. The growth of the do-it-yourself movement
53. Improved nutrition with the consequent decline in the age of menarche
54. Protracted adolescence
55. Decline in the number and significance of rites of passage, birth, death, marriage, etc.
56. Isolation of children from the world of adult concern
57. The acculturation of children by other children
58. The growth of a large aged population
59. The replacement of the extended family by the nuclear family and other living arrangements

F. INSTITUTIONAL TRENDS

60. The institutionalization of problems. This is the tendency to spawn new institutions and new institutional mechanisms for dealing with what were in the past personal, private, or nongovernmental responsibilities
61. Bureaucratization of public and private institutions
62. Growth of big government
63. The growth of big business
64. Growth of multi-national corporations
65. Growth of future studies and forecasting and the institutionalization of foresight mechanisms and long-range planning
66. Growth of public participation in public and private institution decision-making
67. The growing demands for accountability and the expenditure of public resources
68. Growth of demands for social responsibility

G. INTERNATIONAL

69. Problems of the global commons
70. Decline in U.S. Military strategic dominance
71. Decline in U.S. world market dominance
72. Regional and local conflicts disrupting the international economic order
73. The demand for a new international economic order
74. The reintegration of China into the world economy

* Based upon Joseph F. Coates, "Why Think About the Future," Public Administration Review, September/October 1976.

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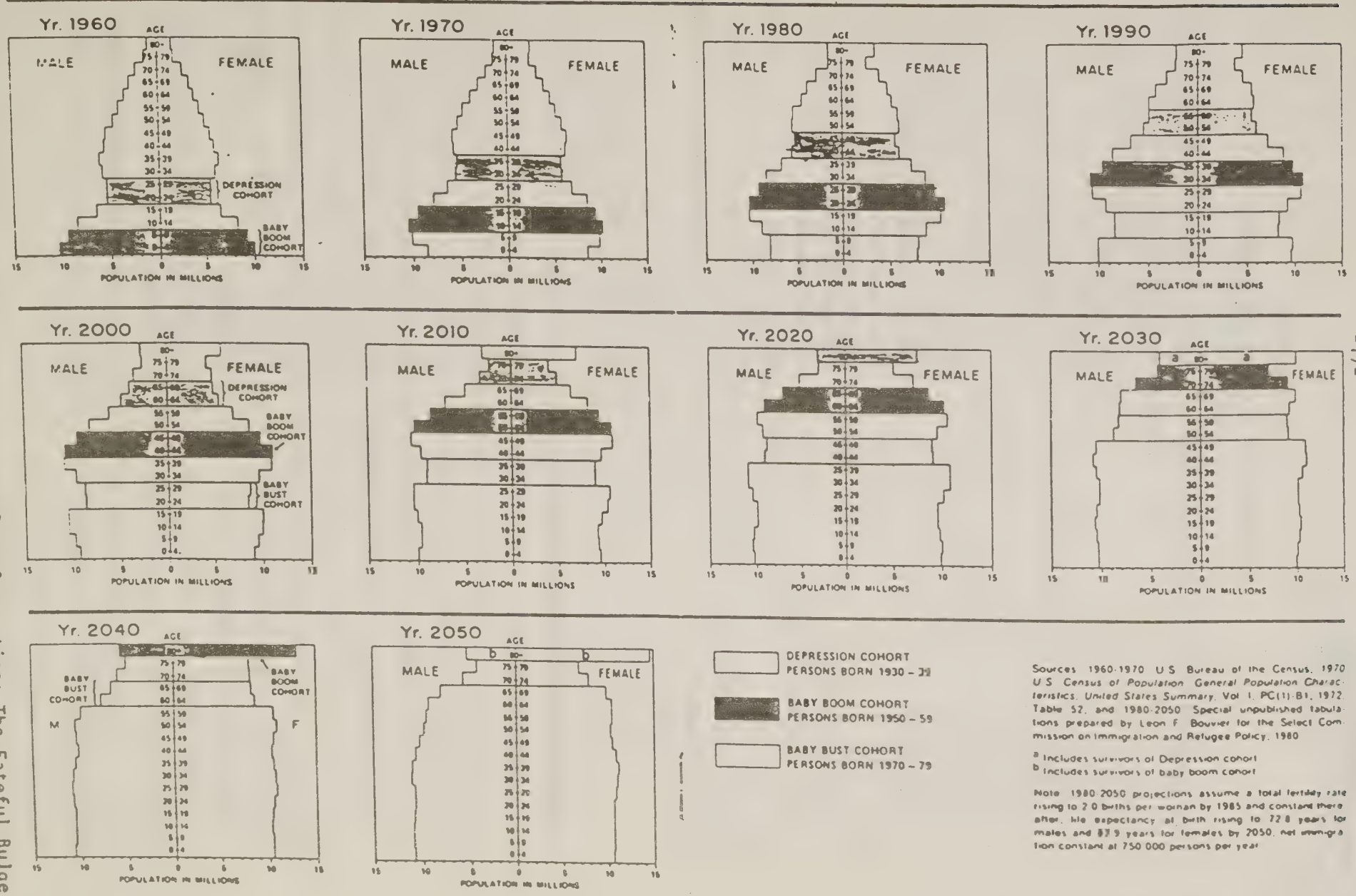
Progress of Depression Cohort, Baby Boom Cohort, and Baby Bust Cohort Through U.S. Population Age-Sex Pyramid: 1960-2050



Sources: 1960-1970 U.S. Bureau of the Census, *1970 U.S. Census of Population General Population Characteristics, United States Summary*, Vol. 1, PC(1)-B1, 1972, Table 52, and 1980-2050 Special unpublished tabulations prepared by Leon F. Bouvier for the Select Commission on Immigration and Refugee Policy, 1980.

[a] Includes survivors of Depression cohort
[b] Includes survivors of baby boom cohort

Note: 1980-2050 projections assume a total fertility rate rising to 2.0 births per woman by 1985 and constant thereafter, life expectancy at birth rising to 72.8 years for males and 80.9 years for females by 2050, net immigration constant at 750,000 persons per year.

SOURCE: Population Bulletin - America's Baby Boom Generation: The Fateful Bulge, Volume 35, Number 1, Population Reference Bureau, Inc., April 1980, Figure 4.

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Exhibit 4c

TELEMATICS DEVICES AND SYSTEMS

TELEMATIC DEVICES WIDELY AVAILABLE BEFORE 1960

- Telegraph
- Telephone
- Microwave transmission
- Radio (AM/FM)
- Television (B/W)
- Facsimile
- Phonograph
- Tape recording
- Xerography
- Cable (one-way)
- Transponders
- Typewriter
- Movies
- Still Photography (B/W, color)
- Polaroid
- Microfilm
- Robots - first generation
- Mainframe computers

TELEMATIC DEVICES WIDELY AVAILABLE BY THE '70's

- Touchtone pad (push button keyboard)
- Call forwarding
- C.B. radio
- Picturephone
- Portapack video recorder, the minicam
- Color television
- Portable television
- Frame grabber
- Slow scan
- Private microwave transmission
- Audio cassette
- Low cost xerography
- Two-way cable television
- Electric typewriter
- Geophysical Satellites
- Optical scanner
- Microfiche
- Robots - second generation
- Hand Calculator
- Minicomputer
- Central processing unit memory

Telematic Devices Now & Emerging in the '80's

- Microprocessor
- 800 numbers
- Voice answer back
- Voice activation
- Low cost video recorders
- Video discs
- Large screen television
- Laser
- Fiber optics
- Video cassettes
- Electronic scratch pad
- Direct satellite broadcasting
- Word processor
- Graphic & color display
- Speech compressor
- Packet switching
- Robots - third generation
- Microcomputers
- Large scale integrated circuits
- New memory systems: solid state, laser, bubble, backend processes
- Morpheme generator

Some Significant Systems & Software

- Micro home information system
- Computer utilities - Illiac IV, Arpanet, Plato
- Communication satellites - Comsat, Intelsat, ATS-6
- Other space Satellites - ERTS, weather, agriculture
- CAD (computer-assisted design)
- CAM (computer assisted manufacture
- Simulation-modeling
- Aids to the handicapped
- Electronic switching systems (ESS)
- Mobile cellular system
- Information utilities - The Source, Lockheed, Prestel
- Teletext
- Videotex
- Pattern recognition - voice, signature
- Encryption
- PBX self contained telephone exchanges

Exhibit 5

The Workshops

The three workshops dealt respectively with:

- brainwriting;
- scenario building;
- nominal group process followed by a futures wheel exercise.

The purpose of each of the workshops was to approach the same subject from three different points of view so that one would be able to compare the results of the workshops and give the participants different kinds of experiences, each of which they could potentially carry away with them and use as a planning tool at their home base.

The brainwriting exercise was conducted with eight people around a table, using a full stock of the forms attached. The critical thing in brainwriting exercise is that the group stimulates each other, but in a quiet, deliberative way without the hurly-burly and the tension that often accompanies a brainstorming session. The critical thing in the exercise is that people take as much time as they want to present their ideas or to build upon and comment upon the ideas of others. (See Exhibit 5a.)

The nominal group process is a technique for evoking ideas also, but it depends upon a tighter structuring of the situation. The attached Exhibit 5b explains the process and how it operates. It permits one to come to a sharply focused set action or operational conclusion. In this case the group was addressing questions about the action implications of the information technology and other trends for their organizations.

The nominal group technique was followed through by a secondary exercise to get at the implications of the actions. Taking the most prominent action recommended by the group out of the nominal group technique, using the attached futures wheel form, Exhibit 5c, the group was told to assume that proposed most important action had occurred. That is placed at the center of the wheel. "Now identify the half dozen most important consequences of that action." After each one fills out his form quietly in five or six minutes, they revert to a group discussion. Were there more time available, one would then repeat the cycle and have the group get at secondary implications of that action.

Exhibit 5 (cont'd)

Scenario building. The third group, approximately eight people, sat in discussion for forty minutes attempting to define a future agricultural extension system again reflecting and assimilating the information presented earlier and to brief that back to the assembled group emphasizing two clusters of factors: (1) those elements which would remain essentially the same as they are today; and (2) those elements in the system that would be substantially or radically changed.

By self report from the groups and the group members the exercises were successful in their objectives.

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Exhibit 5a

BRAINWRITING

INSTRUCTIONS: Brainwriting, a variation on brainstorming, permits more thoughtful interaction.

You have been asked a question. Please list three or four responses in one or two sentences each. Leave the bottom half or third of the paper blank for the next step. When you have responded, put the piece of paper in the center of the table. Either start a new sheet or take a response sheet that someone has already put into the center of the table. If you take a sheet with responses already on it, read those responses, add your own independent comments, or build upon the ideas already presented. Do not criticize or correct others' responses. Continue until everyone has had ample time to examine and comment on everyone else's replies -- about 20-30 minutes.

Exhibit 5b

MODIFIED AND ADAPTED FROM

Guide for Leaders Using Nominal Group Technique

James G. Coke
Carl M. Moore

Nominal Group Technique (NGT) was invented in 1968 by Andre Delbecq and Andrew Van de Ven. The most comprehensive description can be found in Delbecq, Van de Ven, and Gustafson, *Group Techniques for Program Planning* (Scott, Foresman and Company, 1975). Those who plan to use NGT extensively should become acquainted with this volume, especially chapters three and five. This brief guide is based upon those chapters, plus the authors' experience with the technique.

Academy for Contemporary Problems

1501 Neil Avenue
Columbus, Ohio 43201

444 N. Capitol Street, N.W.
Washington, D.C. 20001

SUMMARY OF NGT PROCEDURES

Pre-Meeting Preparation

1. *Formulate and test the NGT question.*
2. *Assemble supplies* (easel, flip chart, felt-tip pen, masking tape, and deck of 3x5 cards for each group). If possible, type the NGT question at the top of a sheet of paper and duplicate a copy for each member.
3. *Prepare the meeting room.* Wall surfaces should be suitable for taping up sheets from the flip chart. The best table arrangement is a U, with the easel located at the open end.
4. *Train inexperienced group leaders.*

THE NGT QUESTION

You should pay careful attention to the phrasing of the question. It should be as simple as possible, but it should elicit items at the desired level of specificity and abstraction.

Several people should be involved in preparing the question. They should begin by clarifying the objectives of the meeting. They should then illustrate the types of items they want to get from the group. With objectives and examples in mind, they can proceed to the composition of the question.

The NGT question should be pilot tested, if there is time, to make sure that it evokes the desired type of response.

NGT IS A SINGLE-QUESTION TECHNIQUE

A *poor* NGT question: "What are the goals to be achieved and the projects and programs to be undertaken by the city's community development program?"

A *good* NGT question: "What obstacles do you anticipate to carrying out the city's housing rehabilitation programs?"

Opening Statement

Inform the participants of the context of the session, indicating how NGT results will be used in subsequent steps. Summarize the four basic NGT steps for groups who are not familiar with the process.

IDENTIFY YOUR REPORTER NOW.

Conducting the NGT Process

1. *Silent generation of ideas in writing.*

Read the question aloud and ask members to list their responses in phrases or brief sentences. Request that they work silently and independently. Allow 4-8 minutes.

2. *Round-robin recording of ideas.*

Go around the table and get one idea from each member. Write the ideas on a large flip chart. As you finish each sheet, tape it on the wall so that the entire list is visible. . Do not allow discussion, elaboration, or justification.

3. *Serial discussion of the list of ideas.*

Explain that the purpose of this step is clarification. Read item 1 aloud and invite comments. Then read item 2 and continue discussing each item in turn until the list is covered. Arguments are unnecessary because each member will have a chance to vote independently in Step 4. As soon as the logic of a position is clear, cut off discussion.

4. *Voting.*

Each person selects the five . items that are most important to him and writes each on a 3x5 card. The votes are recorded on the flip chart in front of the group. The group then discusses the voting patterns. If desired, the items can be further clarified and a second vote taken.

A REVIEW OF PRINCIPLES IN NGT

1. Exploration of ideas.
2. Deal with a single question.
3. Avoids conflict.
4. A primary focus is discussion for clarification.
5. Develop group ownership; avoid individual ownership.
6. Consensus not sought.
7. Diversity, priority, clarity sought.

CONDUCTING THE NGT PROCESS

Step One: Silent Generation of Ideas in Writing

1. Distribute the question on individual sheets of paper or display it before the group. Read the question aloud to the group and ask members to respond to it by writing their ideas in phrases or brief sentences.

2. Ask members to work *silently* and *independently.*

3. Some members may ask about the meaning of the NGT question. You may illustrate the degree of abstraction desired, but do not lead the group in any direction. Tell persistent questioners to respond to the NGT question in whatever way is most meaningful to them.

4. Allow four to eight minutes for this step. In a large group, a short period of silent writing will limit the number of items the members produce.

Step Two: Round-Robin Recording of Ideas

1. Explain that the objective of this step is to map the group's thinking. As you go around the table, each member is to present orally *one* idea from his own list in a phrase or brief sentence without discussion, elaboration, or justification. You will continue to go around the table until all ideas have been presented.

2. Explain that each member is to decide whether his item duplicates one already presented.

3. The leader should record items on flip chart sheets as rapidly as possible, numbering items in sequence and recording them in the member's own words.

4. After you fill a sheet with numbered items, tape it to the wall where it will be visible to everyone.

5. With a large group, the length of the list can be controlled in several ways. For example, you can announce in advance that you will solicit items around the table only two or three times. Or, when a sufficient number of items have been generated, say that you will go around the table only once more.

Step Three: Serial Discussion of the Listed Ideas

1. Explain that the purpose of this step is to clarify the ideas presented. Read each item aloud in sequence and invite comments. Members may note their agreement or disagreement, but arguments are unnecessary since each person will vote independently in Step Four. Do not waste time on conflict. As soon as the logic of a position is clear, cut off discussion.

2. Announce in advance the number of minutes to be devoted to this step. (The usual rule of thumb is to allot two minutes times the number of items. If time is short, allow only the number of minutes until adjournment, minus 15 minutes for the voting in Step Four.)

3. Encourage viewing the list as group property. Anyone can clarify or comment on any item. Above all, do *not* ask a member to clarify the item he has contributed. It is particularly useful to encourage someone other than the contributor to clarify items. The group leader can model good behavior at an appropriate point with a comment such as, "Well, to me this item means . . ."

4. Within reason, new items can be added and small editorial changes made. Duplicate items may also be combined. However, the leader should resist attempts to combine many items into broader categories. Some members may seek to achieve consensus by this means, and the precision of the original items may be lost.

Exhibit 5b (cont'd)

Step Four: Voting

1. Ranking is the simplest and usually most effective voting technique.

2. Each person should receive five 3x5 cards (seven cards, if the list is long). Ask members to select the five (or seven) most important items and write one in the center of each card. They should write the item's sequence number in the upper left corner.

6

Parking spaces reserved for handicapped.

3. Give the group a time limit (four or five minutes) for selecting its priority items and do a countdown (e.g., "You have two minutes left."). Request that the group members work silently, and that they wait to rank-order the cards until everyone is finished and the ordering can be done together.

4. When everyone has completed the set of five cards, announce that the voting will begin.

5. By show of hands take the vote "How many selected #1" -- count and enter the tally on the flip chart.

"How many selected #2" -- count and enter the tally on the flip chart.

(See box on right.)

VOTE

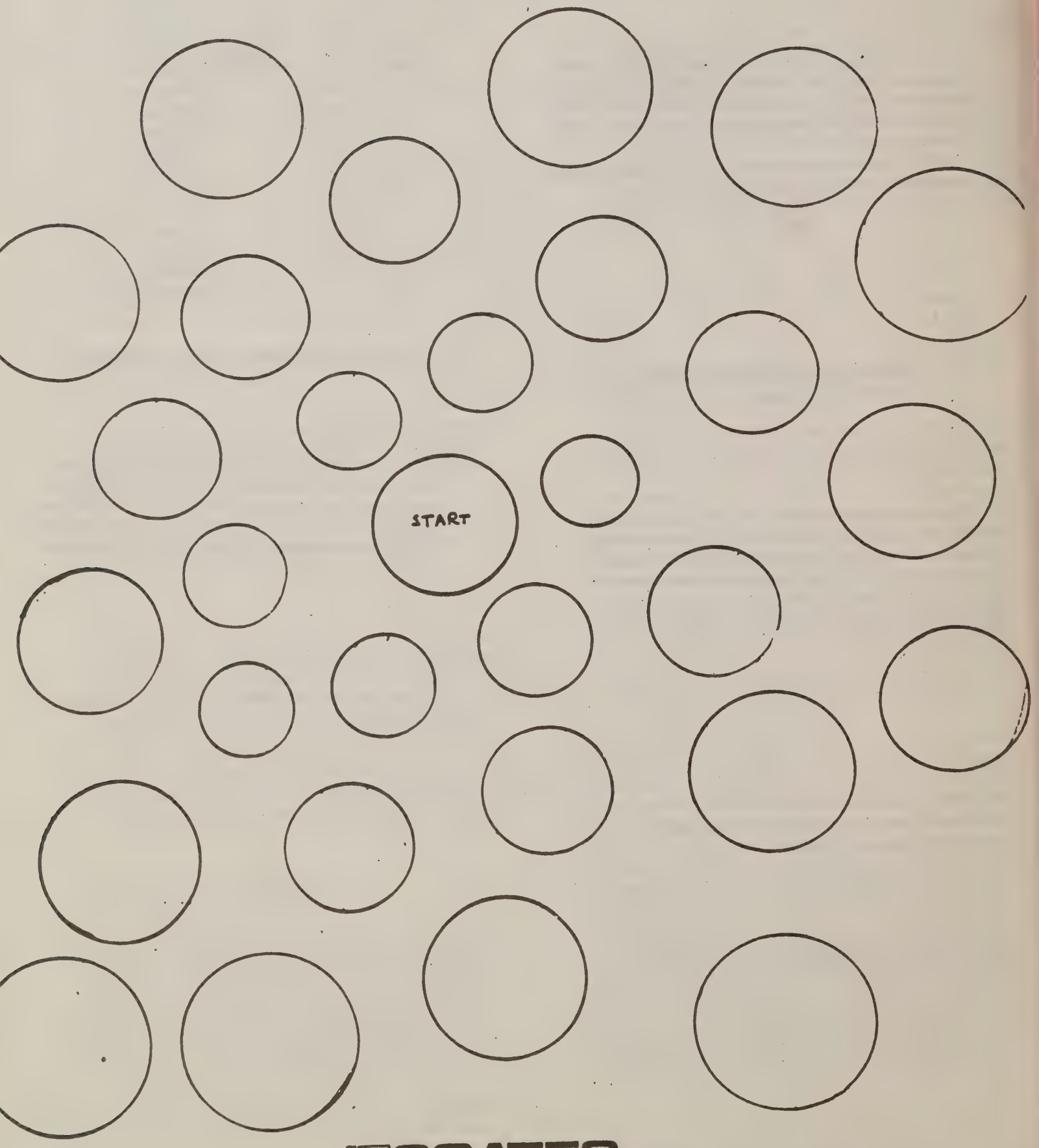
1.	12	15.	7
2.	6	16.	1
3.	0	17.	0
4.	4	18.	0
5.	8	19.	0
6.	3	20.	0
7.	0	21.	0
8.	0	22.	1
9.	1	23.	0
10.	7	24.	0
11.	5	25.	0
12.	0	26.	0
13.	4	27.	0
14.	0		

6. Lead a discussion of the voting pattern.

7. If time permits, the group can further clarif the items and vote again. Keep the discussio brief, and caution people not to change thei minds frivolously. Research shows an averag change of only 10 to 12 percent from the result of the initial vote.

8. Reporter reports back to the group

FUTURE WHEEL



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Daniel I. Padberg is dean of the College of Food and Natural Resources at the University of Massachusetts at Amherst, Massachusetts.

Padberg spoke about how the Cooperative Extension Service will meet future public needs.

How Extension Will Meet Public Needs for the Future

by D. I. Padberg

My purpose in these comments is to look briefly at some possible--perhaps expected--changes in Extension clientele. From these changes we may be able to make a few observations about the adaptation and changes needed in the Extension system as we know it today. As background, it seems to me necessary also to make some observations about how Extension fits into the Land Grant machinery and what we may expect from our economy in the decades ahead.

Extension is a diffusion mechanism. For that reason its historic use has been to move knowledge and information to the small or disorganized components of our society. Households and small business--especially agriculture--have been our primary targets. Within these groupings, the poor households and small and poorly financed farms have been of special concern as Extension clients. While it is true that wealthy households and large commercial farms are also significant Extension clients, these clients use many other information sources. It is also true that big business and organized parts of our society such as governments need knowledge and information from the Land Grant system, but there is less need for a diffusion process in this transaction. For these reasons it seems to me that Extension has a special interest in the lower economic levels of the distribution of households and the distributions of farms and agricultural businesses because we are able to give significant social service to people in real need where few alternatives exist.

As I look at the economy and the traumatic events through which we live day by day, I have a great concern for our future. The real income of the average American doubled between the end of World War II and the mid-1960s. This was largely the result of an industralization process. Enthusiastic workers and new technology put American industry in a super competitive position in relation to the rest of the war-torn world. Our balance of payments surpluses supported both the Marshal Plan and the accumulation of

a great part of the world's gold in Fort Knox. A new technology enabled us to exploit the earth's crust much faster and make its products much cheaper.

By the late 1970s almost all of these factors had reversed. The enthusiastic workers and new technology were in other countries. The rate of exploitation of the earth's crust led to sharply increased prices for natural resources. The balance of payments reversed earlier than many of us thought as the gold flow began to move out in 1958. But it has been hard for us to lower our expectations. In addition to buying more overseas than we sell, we have consumed more at home than we produce. We accomplish that by borrowing against the future. As any household learns, that becomes increasingly expensive as it is increased. In view of all of these things public money is painfully scarce. It means that public services must shrink including Extension and welfare transfer payments to poor households. I think as a society we'll be forced to live less well and will have many more households in real need concerning food, clothing, and shelter.

At the same time households in real need are increasing in numbers. The small subsistence-type farm is growing in numbers for the first time in many decades. There are a list of reasons for this. The enormous deterioration of the quality of life in urban settings has made rural living relatively more attractive. Disenchantment with industrial work and with industrial food gives rural small farm life more appeal. As the numbers of subsistence households increase, this will encourage the further development of subsistence farms. Tax and other public legislation encourages land owners to get their land under cultivation for tax advantages regardless of the profitability of the operation. This set of influences will lead to large numbers of Extension clients both in the low economic level households--households in need--and small farms by the turn of the century. The stressed public budgets will find that providing an Extension diffusion mechanism that is capable of helping these people help themselves is much cheaper than the welfare alternative.

As we look at the opportunities to use high tech in the Extension diffusion process, I think we should give some thought to the kind of clients that we may be working with. Poor households and the small farms will not be very accessible by some of the exotic technology we see developing. Certainly Extension's responsibility will include using the new media and working with organized aspects of our society, but we may continue to have significant clients who are not accessible with high tech media and methods.

Harry Strong, of the MITRE Corporation, McLean, Virginia presented an overview of computer and communications technology.

An Overview of Computer and Communications Technology

by

Harry M. Strong
The MITRE Corporation
20 April 1982

Mr. Strong's talk focused on advances in the area of computer and communications technology. He briefly reviewed MITRE's Corporate characteristics pointing out that MITRE is an independent, not-for-profit corporation. It exists in the public interest and has no vested interest in one particular form of technology over another. MITRE's role is to work closely with the Federal government in assessing their technology requirements and engaging in systems engineering activities. He then reviewed the technology "climate". He suggested that we are moving into a period of "demand pull" rather than "technology push". He believes that the corner has been turned and that individuals expectations are rising with regard to how technology can help them do their jobs. He pointed out that deregulation of communication services and dramatic price performance improvements will have a significant impact on businesses and the public in terms of the use of technology. He see breakthroughs coming in services integration and is excited about the computer literacy that is being exhibited, particularly with our youth. He pointed out that students today are comfortable with high technology and they will be looking to employ technology in diverse areas. He also noted that standards associated with technology development have only been moderately successful and that more work needs to be done in this area.

Mr. Strong pointed out that capital investment per worker in the United States has been nearly $54,000 in the farming sector and ranging to only $2,000 in the office. The cost of staff has been rising roughly six percent per year over the last six or eight years, communications costs have been dropping 11 percent per year, computer logic at 25 percent per year and computer memory at 40 percent per year. It is, therefore, important to look to technology to offset the rising cost of manpower.

Mr. Strong then offered a "technology taxonomy" which included processing technology, communication technology, storage technology, and delivery technology. Under the area of processing technology he reviewed large-scale computer systems, distributed processing systems and recent trends in microprocessors and personal computers. Security systems were also discussed briefly as were distributed, special purpose, and general purpose software. He believes that distributed computing offers many opportunities over centralized approaches and that the cost of equipment and communications make these distributed systems feasible today. He pointed out that some of the advantages of distributed computing include greater service continuity, smoother growth, better performance, easier restructuring and simpler development. He pointed out that cost/performance improvements will continue throughout this decade in both memory and

computing power. The main storage media will likely remain magnetic disks to be augmented by optical disks towards the end of the decade. There is a need for better input technologies and concern for the interface between the user and the system. Output technologies will continue to focus on using CRTs and non-impact printing devices with an increasing use of graphics and color. Software will continue to be a major obstacle and an increasing percentage of the total cost of computer-based systems. Local area networks will become more prevalent and will evolve from twisted pair technology to cable and finally to fiber optics. The 32 bit microprocessor chip will soon be available and cost around $100 and a one megabit storage chip will soon be available.

Mr. Strong pointed out that the microprocessor/microcomputer revolution will have major impacts on our society as more and more intelligence is added to products. They will make changes in our personal life styles as well as the way in which we organize and conduct business. There will also be major dislocations in the labor market reflecting the change in labor requirements. The trend toward software representing a greater percentage of the cost of a total system will continue through out this decade to a point where software will represent 80 to 90 percent of total system development costs.

In the area of communications technology, Mr. Strong reviewed value added networks, local area networks and contrasted circuit and packet switching networks. He also reviewed cable systems, direct broadcast satellites, fiber optics and narrowcasting. He pointed out that the computer revolution and the advent of inexpensive computer processing will take us into a system of local and wide area networks. These networks will connect a sophisticated array of devices and provide enormous power to users to do data processing tasks and to store and retrieve information. He reviewed the reason why digital transmission is the wave of the future. This included such advantages as the regeneration of digital pulses (reducing accumulated noise in the system), the lowering cost of large scale integration, the lowering costs for wide bandwidth communications, the existence of increasing quantities of digital data and the ability to put more and more circuits on a wire at a time when communications congestion is becoming a major problem.

Circuiting switching, message switching and packet switching technologies were reviewed pointing out that each has their place but that more and more networks are moving towards a packet switching approach. This approach splits messages into small segments and these segments are routed independently. This approach makes efficient use of communications bandwidth given the dynamic allocation of

routes and also gives high availability of networks assets. There is also advantages in terms of speed and response to the user over some of the other approaches.

Several local area network configurations were reviewed pointing out differences between ring and star configurations with those of a bus architecture. Examples of each were discussed. Mr. Strong pointed out that one of the reasons local area networks will be important in the succeeding decades is that there will be multiple vendors using mixed media and requirements for enhanced services. This will require sophisticated network interconnections but will also require protocol standardization or protocol conversion. Data encryption will also be important and can be easily handled on local area networks.

In the area of satellite systems, it was pointed out that more and more resources will be available to government, industry and the private sector. An example was given where COMSAT has requested three channels that would allow for direct broadcast to 2½ foot diameter antennas costing approximate $100. The converter/descrambler would be $300 to $400 per house with a $14 to $18 a month service charge. It was also pointed out that as of 1981 nearly 10,000 homes have installed the more expensive earth stations now available.

Mr. Strong believes that cable television will become an even more important influence on the delivery of information to the business and home of the future. As of mid-1981, 35 million homes had access to cable and 20 million of those homes subscribed. By 1990, 80 million homes are estimated to have access with nearly 45 million homes subscribing. The typical home cable system can allow for two-way communications, has a proven track record and is relatively inexpensive. It has been shown through research studies however, that subscribership is very cost sensitive.

Mr. Strong reviewed fiber optics technology and pointed out why fibre optics is of interest to the communications community. Fiber optics can be used instead of copper wire or cable for data transmission and the fiber cables are generally smaller, have higher bandwidth (allowing for more information transfer), are more durable, have better transmission noise rejection, are superior to other cable with regard to information security and are becoming easier to use. Some of the disadvantages include high signal loses for some applications and that matching terminations are not totally standard. He sees optical fiber communications being used in telephone systems for high density telephone transmission, in video systems for teleconferencing, in CATV multiplexed transmission, in computer applications for the interconnection of computer and peripheral devices where wide

bandwidth and rapid speeds are necessary and in other broadband services such as electronic mail, facsimile, banking, library applications and video phones. Projections in the 1980-2000 time frame include billion-bit-per-fiber capability at less than 10¢ per fiber mile by the late 1980's, displacement of copper cables to 10 percent by 1990 and virtually all new cable installations in fiber optics by the year 2000. Using this technology, transmission time per page of facsimile will drop to a few tenths of a cent and video telephone costs will likely drop to around $200 by the year 2000, driven by fiber optics advances as well as advances in camera and display technology. Common broadband services in 1990's will include video entertainment, video processing, video shopping and video libraries.

In the area of storage technology, Mr. Strong reviewed both analog and digital optical technology, bubble memory, semiconductor memory, mass storage system and video cassette systems. He contrasted each of these technologies and provided comparison of the storage capacity of typical storage devices. He emphasized the fact that optical disk technology looked very promising and that end user cost in dollars per mega-bit of storage could approach 50¢ to $10 by 1985 for optical disks compared with $30 for magnetic disks and under a $1.00 in 1990 compared to to $10 to $20 for magnetic disks. He contrasted memory density trends of semiconductor memory, bubble

memory and moving head disk drives. Contrasting media costs of various storage technologies, it was pointed out that storing 10^{11} bits of information would require 80 magnetic disk packs costing roughly $40,000. The equivalent storage on a computer compatible tape would require 90 tapes costing a total of $1350, a silver halide fische approach would require 200, 4 x 6 films costing $60 and the same amount of data could be contained on a 12" optical disk at roughly $10, once disks are in mass production. In summary, he stated that semiconductor devices will probably remain the primary storage media but that magnetic disks will continue to improve and that Winchester disk technology is having a marked impact on reducing storage costs. He pointed out that optical disks will also be used for image and document storage and that bubble memories will likely continue to find special purpose applications but the cost/performance trends seem to have slowed for bubble technology.

In the area delivery technology, Mr. Strong discussed office automation trends, electronic mail and message systems, and video and teletex systems. He also reviewed graphics and image processing activities being used to improve the interface between systems and users and looked at on-line bibliographic patent, archival, and graphic information services. He closed with a discussion of voice recognition and synthesis technology. It was pointed out that word

processors are becoming more prevalent, more capable, less costly and more distributed. Word processing systems range from intelligent typewriters, stand-alone systems, clustered systems involving some minicomputer and the larger systems attached to a major computer. Trends in the U.S. office automation market include growth in the implementation of clustered word processors with stand-alone word processors and those connected to large computers leveling off through 1985. Mr. Strong pointed out that many of the word processing systems are also incorporating electronic mail, integration with a publication process or intelligent copiers and typesetting, electronic calendars, and the ability to use data processing systems as well as voice messaging systems associated with an integrated telephone system.

Definitions were given of electronic mail systems and electronic message systems and the differences between the systems were discussed. It is believed that the major input technology will continue to be a typewriter keyboard with some use of joy sticks, touch sensitive screens, and voice input. There will also be special applications requiring optical character recognition and image recognition. Output technologies will continue to focus on using the CRT and non-impact printing but there will be growth in graphics, image and

color output devices. There will also be increased use of voice output systems such as those being employed in automobiles being sold today.

Mr. Strong concluded his discussion by summarizing what he believes to be the impact of these technology advances on our society. He believes it means new ways of organizing, new ways of getting information, new ways of using information, new types of jobs and new ways of working. He suggest that all of these impacts point to one important social and physiology event---change. This change will be important in the life of individuals and organizations and perhaps the greatest challenge to employing new technology is to appropriately manage the process of change.

John R. Fox, broadcast services coordinator, with the University of California Cooperative Extension Service talked about new information technologies, and how they will impact upon Cooperative Extension.

NEW TECHNOLOGY AND THE ELECTRONIC MEDIA

BY

JOHN FOX
BROADCAST SERVICES COORDINATOR
COOPERATIVE EXTENSION
UNIVERSITY OF CALIFORNIA

PRESENTED AT A SEMINAR FOR COOPERATIVE EXTENSION ADMINISTRATORS:
"HIGH TECHNOLOGY INFORMATION SYSTEMS: THEIR IMPLICATIONS FOR COOPERATIVE EXTENSION,"
SHERATON HOTEL, WEST SPRINGFIELD, MASSACHUSETTS, APRIL 20, 1982

SEMINAR - 1

When Bill Shimel first called to extend an invitation to take part in this seminar, he said that he was particularly interested in having a presentation on what new technologies will mean to Cooperative Extension. Practical applications, he said, and answers to questions such as when do we start using new technologies.

I have come 3000 miles to say, frankly, that I don't have any definitive answers. Nobody does.

I attended a workshop on the future of cable programming a couple of weeks ago. One of the speakers was Michael Markovsky, a cable consultant. He said, in paraphrase, CONSULTANTS ARE SUPPOSED TO KNOW ALL THE ANSWERS. WE DON'T. WE'RE JUST A CHAPTER OR TWO AHEAD OF THE CLASS. THE BOOK IS STILL BEING WRITTEN. AND IT'S BEING WRITTEN IN PENCIL.

In fact, the entire communications industry is in a state of turmoil. New audio and video networks keep popping up. Some disappear just as quickly. New electronic devices are introduced to the market with trumpets and drums. Some are never heard from again. The federal government announces plans to squeeze more radio or television stations onto the broadcast spectrum, then can't decide how to go about it ... or even whether it's worth doing in the first place.

If ever you wanted to see survival of the fittest ... or fleet-est ... in action, here's your chance. For the next few years, anyway, new technologies will be purely Darwinian.

So, no, I can't give you answers. In fact, I can't even give you all the questions. Some of them haven't been proposed yet. But perhaps this morning we can clear away some of the smoke and dust raised by all those trampling feet rushing about, trying to get to the head of the new technologies line. If we can do that ... if we can clear up the picture ... then we'll all be in a much better position to deal with communications technology as the great shakeout proceeds.

The biggest smoke cloud of all is the phrase "new technologies." It has become something of a shibboleth for a mystical, magical electronic never-never land apparently populated by ANDS-AND-NANDS, ORS-AND-NORS, BITS, BYTES, BAUDS, and GIGAHERTZ ... which seemingly consume MILLIWATTS and MICROAMPS to produce INPUTS, OUTPUTS, and THROUGHPUTS ... which are carried by TERRESTRIAL UPLINKS, GEOSYNCHRONOUS BIRDS, and DOWNLINKS ON THE AZIMUTH ... only to be gobbled up by M-S-O's, M-D-S's, and S-T-V's at their HEADENDS. A fine state of affairs, that.

There's a phrase in Latin ... OMNE IGNOTUM PRO MAGNIFICO ... which, very roughly translated ... means ANYTHING WE DON'T UNDERSTAND SEEMS COMPLICATED AS HELL. I think that's the case with new technologies. The electronic engineers ... who have a strange sense of humor anyway ... have us bamboozled. They literally have confused us with the facts.

From a purely technical standpoint, the so-called new technologies really are new and very complex. But we aren't engineers and we don't much care about the technical view. We care about the function view. What's important to Cooperative Extension is WHAT these new technologies do, not HOW they do it.

SEMINAR - 3

WHEN OUR ANCESTORS INVENTED SPOKEN LANGUAGE ALL THOSE MILLINIA AGO, THEY HAD A FAIRLY SIMPLE GOAL ... GETTING SOME THOUGHT RATTLING AROUND IN ONE PERSON'S BRAIN INTO SOMEBODY ELSE'S BRAIN. THEY DID IT, CRUDELY AT FIRST AND THEN MORE PRECISELY, BY ASSIGNING MEANING TO CERTAIN SOUNDS UTTERED IN SPECIFIC SEQUENCES. THE PERSON WITH A THOUGHT TO CONVEY ENCODED THAT THOUGHT IN SOUND WAVES DIRECTED AT SOMEBODY ELSE. THE LISTENER THEN DECODED THE SOUND WAVES TO LEARN THE THOUGHT.

IT WAS A FINE SYSTEM. IT STILL WORKS TODAY. BUT THERE WAS A PROBLEM: THE HUMAN VOICE DIDN'T CARRY VERY FAR, EVEN UNDER THE BEST OF CONDITIONS. SO OUR ANCESTORS HAD THEIR OWN TECHNOLOGICAL REVOLUTION. THEY LEARNED TO ENCODE THOUGHTS FOR TRANSMISSION BY HORNS, DRUMS, SIGNAL FIRES, AND THE LIKE. SOON, THEY HAD A COMMUNICATIONS RANGE MEASURED IN MILES INSTEAD OF FEET.

BUT THEN ANOTHER PROBLEM OCCURRED TO THEM. IF THE INTENDED RECIPIENT WAS NOT WATCHING OR LISTENING WHEN THE MESSAGE WAS SENT, THE RECIPIENT MISSED IT. THE MESSAGE HAD TO BE RECEIVED AT VIRTUALLY THE SAME TIME IT WAS SENT AND IN THE SAME SEQUENCE IT WAS SENT. IN MODERN COMMUNICATIONS TERMINOLOGY, THESE SYSTEMS WERE LINEAR. THROUGH THEM, THOUGHTS COULD BE SENT THROUGH SPACE BUT NOT THROUGH TIME.

SO OUR ANCESTORS DEVELOPED FIRST PICTURES, THEN PICTOGRAPHS, AND FINALLY WRITTEN LANGUAGE ... WHICH IS REALLY JUST ANOTHER WAY OF ENCODING THOUGHTS. WRITING HAD A MAJOR ADVANTAGE OVER OTHER COMMUNICATIONS SYSTEMS. IT WAS NON-LINEAR. WITH WRITING, MESSAGES DID NOT HAVE TO BE RECEIVED AT THE SAME TIME THEY WERE SENT. THEY EVEN COULD BE SORTED AND STORED AWAY FOR FUTURE REFERENCE. WRITING GAVE THOUGHTS THE CAPABILITY OF TRAVERSING TIME AS WELL AS SPACE.

THAT WAS THE GREAT COMMUNICATIONS REVOLUTION. THERE HASN'T BEEN ANYTHING COMPARABLE SINCE. AND THERE WON'T BE ANYTHING COMPARABLE IN THE FUTURE UNTIL THE DAY ... IF IT EVER COMES ... WHEN THOUGHTS CAN BE CONVEYED DIRECTLY FROM BRAIN TO BRAIN, HUMAN OR OTHERWISE ... WITHOUT ENCODING OR DECODING, INSTANTANEOUSLY, AND WITH PERFECT FIDELITY. I DON'T EXPECT ANY OF US TO LIVE TO SEE THAT DAY.

WHAT WE HAVE DONE IN THE MILLINIA SINCE THAT GREAT COMMUNICATIONS REVOLUTION IS TO PERFECT BETTER, FASTER, MORE EFFICIENT, MORE SOPHISTICATED ENCODING AND TRANSMISSION SYSTEMS. TO A GREAT EXTENT, WE HAVE REPLACED MECHANICAL SYSTEMS WITH CHEMICAL OR ELECTRONIC SYSTEMS. BUT THEY SERVE EXACTLY THE SAME COMMUNICATIONS FUNCTIONS AS DID THE CLAY TABLETS AND SIGNAL FIRES OF YESTERYEAR: THEY MOVE THOUGHTS THROUGH TIME AND SPACE.

ALL COMMUNICATIONS SYSTEMS ... INCLUDING SO-CALLED NEW TECHNOLOGIES ... ARE BASICALLY TOOLS. TOOLS ARE STUPID. THEY DO JUST WHAT THEY'RE TOLD TO DO, WHAT THEY'RE DESIGNED TO DO. YOU CAN GO DOWN TO THE HARDWARE STORE AND BUY AN ELECTRIC SAW. IT DOES EXACTLY THE SAME JOB THAT HANDSAWS HAVE BEEN DOING FOR THOUSANDS OF YEARS. FASTER, YES. EASIER, YES. DIFFERENT, NOT REALLY.

IT'S IMPORTANT, AS WE DISCUSS NEW TECHNOLOGIES AND THEIR IMPLICATIONS FOR COOPERATIVE EXTENSION, TO KEEP IN MIND THAT THEY ARE JUST TOOLS. AND THEY'RE IMPERFECT TOOLS AT THAT. THEY ALL HAVE THEIR LIMITATIONS.

NOW, LET'S GET DOWN TO SOME SPECIFICS.

THE TELEPHONE. NOT A TERRIBLY NEW TECHNOLOGY, RIGHT? WELL, ALMOST RIGHT. THE CRANK TELEPHONE IS GONE, BUT LOOK WHAT HAS REPLACED IT ... SLEEK PLASTIC INSTRUMENTS WHICH CAN BE MADE TO LOOK LIKE CRANK TELEPHONES OR JEWELRY BOXES OR MICKEY MOUSE. BUT YOU ALSO HAVE DIRECT LONG DISTANCE DIALING, CALL FORWARDING, NOTIFICATION SYSTEMS THAT SOMEBODY IS TRYING TO CALL YOU WHILE YOU'RE TALKING WITH SOMEBODY ELSE, AND CONFERENCE CALLING. IN FACT, THE TELEPHONE SYSTEM IS AN AMAZINGLY FLEXIBLE COMMUNICATIONS NETWORK, AND IT CAN BE PUT TO USE AT A MOMENT'S NOTICE. BUT YOU PROBABLY ALREADY KNOW THAT.

WHAT YOU MAY NOT KNOW IS THAT NEW TECHNOLOGIES HAVE HIT THE TELEPHONE INDUSTRY, PARTICULARLY SINCE MA BELL WAS TOLD IT COULD NO LONGER REQUIRE CUSTOMERS TO USE JUST BELL EQUIPMENT. FOR INSTANCE, YOU CAN BUY A DAROME CO-COVENOR MEET-ME BRIDGE TELECONFERENCE SYSTEM. IT CAN HANDLE ... ON AN AUTOMATIC DIAL-UP BASIS ... A CONFERENCE CALL FROM 20 DIFFERENT LOCATIONS AT THE SAME TIME. OR, IF YOU PREFER, IT CAN HANDLE FOUR CONFERENCE CALLS OF FIVE LINES EACH SIMULTANEOUSLY ... OR MANY COMBINATIONS, EVEN RECOMBINATIONS JUST IN CASE YOU WANT A LARGE CONFERENCE CALL TO BREAK UP FOR A TIME INTO SUBCOMMITTEES.

AH, BUT YOU SAY, WHAT ABOUT PICTURES. BELL SAYS IT DOESN'T BELIEVE THE PICTURE PHONE IS EVERN GOING TO BE A COMMON HOUSEHOLD APPLIANCE. BUT YOU CAN GO TO VIDICOM AND BUY A TELECONFERENCING UNIT WHICH DOES PROVIDE PICTURES. THERE ARE TWO MODELS ... A SUITCASE-SIZE PORTABLE AND A CABINET-SIZE ROLLABOUT. PLUG ONE INTO THE PHONE SYSTEM AND IT SENDS PICTURES AND SOUNDS OVER TELEPHONE LINES.

IT'S SLOW SCAN VIDEO ... ONE PICTURE EVERY 30 SECONDS ... BUT THAT'S QUITE FAST ENOUGH FOR MANY CONFERENCES. OH, YES, YOU CAN ALSO ADD A HARD-COPY SUB-SYSTEM IF YOU FEEL THE NEED TO SEND PRINTED MATERIAL TO YOUR TELECONFERENCE LOCATIONS.

IN A TIME OF RAPIDLY INCREASING TRAVEL COSTS, TELECONFERENCING ... VOICE ONLY OR VOICE-AND-VIDEO ... BECOMES A VERY ATTRACTIVE ALTERNATIVE. BY THE WAY, THE BREAKUP OF A-T-&-T IS LIKELY TO MAKE LONG-DISTANCE CALLING EVEN CHEAPER THAN IT IS NOW. BUT LOCAL RATES WILL GO UP ... PERHAPS DOUBLE ... AND YOU'LL PAY FOR EVERY CALL YOU MAKE, EVEN IF IT'S ONLY ACROSS THE STREET.

THE ORDINARY TELEPHONE SYSTEM ALSO CAN BE USED TO PROVIDE PUBLIC ACCESS TO AN AUDIO TAPE LIBRARY. CALIFORNIA COOPERATIVE EXTENSION CALLS ITS LIBRARY TELETIP. IT CONSISTS OF 300 BASIC TAPES, EACH ONE RUNNING ONE TO THREE MINUTES, ON A VARIETY OF SUBJECTS OF GENERAL INTEREST. IN ADDITION, THERE IS ROOM FOR LOCALIZED AND TIMELY TAPES ... FOR INSTANCE, GOOD DEALS AT THE PRODUCE COUNTER OR COMBATING AN OUTBREAK OF SOME PEST. THE EQUIPMENT WE USE ALLOWS CALLERS WITH TOUCH-TONE PHONES NOT ONLY TO CALL IN BUT TO SELECT THE TAPE THEY WANT JUST BY TAPPING OUT THE TAPE'S CODE NUMBER. OF COURSE, WE ALSO PROVIDE OPERATOR ASSISTANCE FOR PEOPLE WITHOUT TOUCH-TONE.

HOW SUCCESSFUL IS TELETIP? ONE COUNTY OFFICE LOGGED OVER 1000 CALLS IN A MONTH. WE KNOW THE COUNT BECAUSE THE EQUIPMENT GIVES US A PRINTOUT SHOWING EVERY CALL AND THE TAPE WHICH WAS SELECTED. BY THE WAY, WE'VE ALSO ENCOURAGED RADIO STATIONS TO CALL TELETIP WHEN THEY NEED A FEATURE STORY ALL PREPARED AND READY TO GO. THEY CALL, RECORD THE PIECE THEY WANT OVER THE PHONE, WRITE AN INTRODUCTION, AND PUT IT ON THE AIR.

OF COURSE, STANDARD TELEPHONE LINES WILL PLAY A ROLE IN CONNECTING COMPUTER SYSTEMS IN THE FUTURE ... AS THEY ARE ALREADY DOING. HIGH-SPEED COMMUNICATION ... 10,000 OR SO WORDS PER MINUTE ... IS POSSIBLE ON LEASED LINES. BUT A COMPUTER WITH WHAT'S CALLED RS-232 CAPABILITY CAN SEND AND RECEIVE ON ORDINARY TELEPHONE LINES AT SPEEDS OF UP TO 1200 WORDS PER MINUTE.

RADIO IS ANOTHER TECHNOLOGY WHICH HAS BEEN AROUND FOR QUITE AWHILE. AM RADIO DATES BACK TO THE EARLY PART OF THIS CENTURY, FM TO THE 1940s. BUT, HERE, TOO, THE NEWER TECHNOLOGIES ARE HAVING AN IMPACT.

HERE'S A RADIO TRANSMITTING TOWER SENDING OUT ITS SIGNAL, PRETTY MUCH EQUALLY IN ALL DIRECTIONS. ON THE SIGNAL IS A PROGRAM ... MUSIC OR NEWS OR A SOAP OPERA OR WHATEVER. BUT, THAT SIGNAL CAN BE SPLIT. SO FAR THAT'S TRUE ONLY FOR FM STATIONS, BUT WHO KNOWS WHAT THE FUTURE WILL BRING.

ALL RIGHT, YOU SPLIT THE SIGNAL AND USE ONE PART FOR YOUR REGULAR PROGRAM AND THE OTHER PART FOR WHAT IS CALLED A SUBSIDIARY COMMUNICATIONS AUTHORIZATION OR SCA. MUSAK ... THE COMPANY THAT PROVIDES THAT GHASTLY BACKGROUND MUSIC FOR ELEVATORS AND DENTISTS OFFICES ... HAS USED FM SCA'S FOR YEARS TO DISTRIBUTE THE MUSIC, LEASING THAT SPLIT-OFF CHUNK OF THE FM STATION'S SIGNAL. SOME ORGANIZATIONS WHICH PROVIDE READING SERVICES FOR THE VISUALLY HANDICAPPED ALSO USE SCAs TO DISTRIBUTE THEIR PROGRAMS.

IT IS TECHNOLOGICALLY POSSIBLE FOR TWO SCAs TO BE PROVIDED BY EACH FM STATION. AND THERE'S CURRENTLY A PROPOSAL BEFORE THE FCC TO ALLOW NON-COMMERCIAL FM

STATIONS TO DO JUST THAT ... AND TO LEASE THOSE SCAs OUT. THAT RAISES THE POSSIBILITY THAT SECONDARY OR EVEN TERTIARY BROADCASTING CHANNELS WILL BE AVAILABLE IN THE FUTURE FOR, SAY, FARM BROADCASTS ... OR CONSUMER BROADCASTS ... INDEPENDENT OF A STATION'S REGULAR PROGRAMMING WHICH MAY NOT ALLOW ENOUGH TIME FOR INFORMATION COOPERATION EXTENSION WANTS TO GET OUT.

SCAs ARE JUST ONE PART OF THE PROLIFERATING BROADCAST SERVICES. IN 1940 ... THE GOLDEN AGE OF RADIO ... THERE WERE JUST 1465 AM RADIO STATIONS ON THE AIR IN THE U.S. NO FM, NO TV. AS OF FEBRUARY 28, 1982, THERE WERE 9116 AM AND FM STATIONS ON THE AIR ... AND ANOTHER 414 AUTHORIZED BUT NOT YET IN SERVICE.

IT'S NOT UNUSUAL FOR LISTENERS IN METROPOLITAN AREAS TO BE ABLE TO TUNE IN 50, 60, 70 OR MORE RADIO STATIONS. THAT MEANS COMPETITION IS FIERCE FOR LISTENERS. BUT NO STATION CAN REASONABLY EXPECT TO ATTRACT A MAJORITY OF THE LISTENERS ... OR EVEN A SUBSTANTIAL PLURALITY. THIS FRACTIONALIZATION OF THE RADIO AUDIENCE HAS FORCED STATIONS TO NARROW THEIR PROGRAMMING TO APPEAL TO A SMALLER BUT MORE CAREFULLY DEFINED SEGMENT OF THE PUBLIC ... WHICH IS WHY YOU HAVE SPECIALIZED FORMATS SUCH AS ALL-NEWS OR GOLDEN OLDIES OR COUNTRY OR WHATEVER.

IT ALSO HAS FORCED STATIONS TO SEARCH OUT CHEAPER MEANS OF OPERATING. THAT MEANS, FOR THE MOST PART, AUTOMATED OPERATION. AUTOMATION EQUIPMENT NOW ON THE MARKET CAN GIVE A SURPRISINGLY GOOD IMITATION OF LIVE BROADCASTING, BUT WITHOUT A DISC JOCKEY ON THE PREMISES. THE MUSIC AND THE COMMERCIALS ARE PLAYED ACCORDING TO A SET OF INSTRUCTIONS PROGRAMMED INTO A SMALL COMPUTER.

SEMINAR - 9

SATELLITE RADIO NETWORKS NOW GOING ON LINE CAN PROVIDE AUTOMATION FROM ACROSS THE CONTINENT. SIMPLE AUTOMATED SWITCHING GEAR AT THE STATION BLENDS THE NETWORKS PROGRAMMING WITH RECORDED LOCAL COMMERCIALS SMOOTHLY, WITHOUT HUMAN INTERVENTION.

EVEN THE TRANSMITTERS CAN OPERATE ALL BY THEMSELVES.

THE OPERATOR-LESS RADIO STATION POSES SOME SERIOUS PROBLEMS FOR ORGANIZATIONS SUCH AS COOPERATIVE EXTENSION WHICH HAVE DEPENDED ON STATIONS TO DISTRIBUTE CERTAIN KINDS OF MATERIAL. ASIDE FROM COMMERCIALS, TIME SEGMENTS FOR LOCAL PROGRAMMING ... WINDOWS, AS THEY'RE CALLED ... OFTEN ARE LIMITED IN NUMBER AND ARE OF VERY PRECISE DURATION. FURTHERMORE, MATERIAL TO FILL THOSE WINDOWS USUALLY MUST BE RECORDED WELL IN ADVANCE SINCE THERE'S NO LIVE ANNOUNCER.

NARROWLY FORMATTED STATIONS ALSO POSE PROBLEMS BECAUSE THE STATIONS ARE MUCH MORE PICKY ABOUT WHAT MATERIAL THEY WILL USE. THE GENERAL RADIO RELEASE IS A DYING BREED. ON THE OTHER HAND, NARROWLY FORMATTED STATIONS MAKE IT EASIER FOR US TO BEAM OUR INFORMATION TO A PARTICULAR AUDIENCE AND AVOID THE WASTE INHERENT IN A "SHOTGUN" APPROACH.

BY THE WAY, VARIOUS TECHNICAL AND REGULATORY MOVES WILL CERTAINLY MEAN EVEN MORE RADIO STATIONS ON THE AIR ... AND FURTHER FRACTIONALIZATION ... IN THE FUTURE.

TELEVISION TODAY IS ABOUT WHERE RADIO WAS IN THE 1950s ... THE DOMINANT MASS MEDIUM, RECEIVABLE BY VIRTUALLY THE ENTIRE POPULATION, AND SCARED SILLY THAT

A NEWER TECHNOLOGY IS ABOUT TO KNOCK IT OFF. TELEVISION RUINED RADIO'S PARTY THREE DECADES AGO. SOME FM STATIONS ACTUALLY WENT OFF THE AIR. BUT RADIO BOUNCED BACK. NOW, OVER-THE-AIR COMMERCIAL TELEVISION IS THREATENED BY CABLE, SUBSCRIPTION TV, VIDEOTAPE, AND SOON BY DIRECT BROADCAST SATELLITE. MORE ABOUT THEM IN A MINUTE OR TWO.

NEW TECHNOLOGIES STARTED OUT BEING VERY GOOD FOR COMMERCIAL, OVER-THE-AIR TELEVISION. RUGGED, LIGHTWEIGHT PORTABLE CAMERAS AND VIDEOTAPING EQUIPMENT ... CALLED ENG FOR ELECTRONIC NEWS GATHERING ... GAVE TV THE CAPABILITY OF BRINGING NEWS EVENTS INTO THE LIVINGROOM WITH NONE OF THE DELAY INHERENT IN FILMED COVERAGE OF THE SAME EVENTS. COMBINED WITH SATELLITE DELIVERY OF NEWS REPORTS, ENG PERMITTED LIVE TV COVERAGE FROM ANYWHERE SATELLITE UPLINKING GEAR COULD BE FOUND. AND IT IS TRUCK-PORTABLE.

COMMUNITY ANTENNA SYSTEMS ... THE PRECURSORS OF CABLE ... CARRIED TELEVISION SIGNALS INTO PREVIOUSLY UNREACHABLE PARTS OF THE COUNTRY, EXTENDING TV'S "MARKET PENETRATION" TO NEARLY 100%. IN OTHER WORDS, TELEVISION WAS EVERYWHERE. AND IT STILL IS. AS OF FEBRUARY 28, 783 COMMERCIAL STATIONS AND 263 EDUCATIONAL STATIONS WERE ON THE AIR. ANOTHER 160 OR SO HAVE BEEN AUTHORIZED, MOST OF THEM COMMERCIAL.

BUT, WAITING IN THE WINGS ARE 4000 MORE STATIONS OF A NEW KIND ... LOW POWER TELEVISION OR LPTV. THESE WILL BE MIDGET STATIONS, OPERATING WITH AS LITTLE AS TEN WATTS OF POWER AS COMPARED WITH THE 50,000 OR MORE WATTS OF A FULL-SERVICE OUTLET. AND THEY WILL COVER AN AREA ONLY FIVE OR TEN MILES ACROSS RATHER THAN 200 OR 300 MILES. THEY WILL BE WHAT AMOUNTS TO NEIGHBORHOOD STATIONS.

THERE'S NO WAY OF KNOWING WHAT EFFECT LPTV WILL HAVE ON ITS FULL-SIZE COUSINS. THE FCC HASN'T EVEN MADE A DENT IN THE THOUSANDS OF APPLICATIONS FOR LPTV STATIONS ... AND WON'T, IT SAYS, FOR AT LEAST ANOTHER YEAR. BUT, WHEN THOSE STATIONS GO ON THE AIR, THEY'LL NEED SOMETHING TO BROADCAST ... SOMETHING DIFFERENT FROM WHAT THE BIG STATIONS ARE AIRING. WILL THAT OPEN THE DOOR FOR PROGRAMMING FROM COOPERATIVE EXTENSION? IT'S WORTH KEEPING IN MIND.

AS FOR THOSE FULL-SERVICE, FULL-SIZE COMMERCIAL TELEVISION STATIONS, MY GUESS IS THAT THEY WILL SURVIVE AND EVEN PROSPER, AT LEAST FOR THE REST OF THIS CENTURY. THEY MAY NOT BE AS PROSPEROUS IN 1990 AS THEY WERE IN 1980, BUT THEY'LL BE THERE.

TWO FACTORS LEAD TO THIS OPTIMISTIC PREDICTION. ONE, TELEVISION'S INCREDIBLE MARKET PENETRATION. A STUDY BY DOYLE DANE BERNBACH ... ONE OF THE MADISON AVENUE BIGGIES ... PUTS CABLE PENETRATION RIGHT NOW AT 31% AND PROJECTS IT WILL RISE TO 60% BY 1990. OVER-THE-AIR TELEVISION ALREADY HAS 100% PENETRATION, A RATE PRESENTLY EQUALLED ONLY BY RADIO. TWO, TELEVISION WILL INCREASE ITS NEWS AND INFORMATION PROGRAMMING ... WHICH ALREADY IS TV'S NUMBER ONE GUARANTEED AUDIENCE ATTRACTER. IT'S NO ACCIDENT THAT "60 MINUTES" ... OVER AN ENTIRE SEASON ... IS THE HIGHEST RATED PROGRAM ON THE AIR. IT'S ALSO NO ACCIDENT THAT CBS, STARTING NEXT FALL, WILL OFFER ALL-NEWS TV FROM 2 TO 5 A.M. ... THAT NBC AND ABC EACH WILL BE ADDING HOUR-LONG NEWSCASTS TO THE END OF THEIR BROADCAST DAYS.

AND LET'S NOT FORGET ABOUT TELETEXT. THE FCC ALREADY HAS SET ASIDE SEVEN LINES OF WHAT IS CALLED THE VERTICAL BLANKING INTERVAL ... ESSENTIALLY UNUSED PORTIONS

OF THE TV PICTURE ... FOR TELETEXT TRANSMISSIONS. THE TELETEX MESSAGE APPEARS ON THE SCREEN ONLY BY USE OF A SPECIAL TUNER AND HAS NO EFFECT AT ALL ON THE REGULAR PROGRAM. IT'S ROUGHLY SIMILAR TO FM'S SCA. AND PILOT SYSTEMS ALREADY ARE ON THE AIR.

ONE OTHER BIT OF LATE-BREAKING NEWS. NEC AMERICA INC. HAS JUST COME OUT WITH A DUAL CHANNEL VIDEO TRANSMISSION SYSTEM. IT ALLOWS TWO INDEPENDENT CHANNELS TO BE IMPOSED ON A SINGLE TV SIGNAL. SO FAR, ITS ONLY APPLICATION IS IN ELECTRONIC NEWS GATHERING. BUT IN THE FUTURE, PERHAPS WE'LL SEE STEREO TELEVISION. BETTER STILL, MAYBE EVERY TV STATION WILL BE ABLE TO BROADCAST TWO SEPARATE PROGRAMS AT THE SAME TIME ... ALONG WITH EQUALLY SEPARATE TELETEXT.

THE IMPLICATIONS FOR COOPERATIVE EXTENSION ARE CLEAR: START GETTING VERY FRIENDLY WITH YOUR TV NEWS ASSIGNMENT EDITORS. AND START USING TV AS AN AWARENESS GENERATOR, AS AN APPETITE WHETTER FOR COOPERATIVE EXTENSION INFORMATION AND SERVICES.

NOW TO THE BOGEYMEN, THE FLIES IN TELEVISION'S SOUP, THE REAL NEW TECHNOLOGIES. SATELLITES FIRST. FOR REASONS WHICH NEWTON COULD EXPLAIN, IF YOU PUT AN OBJECT 22,300 MILES IN SPACE AND GIVE IT JUST THE RIGHT SPEED, IT WILL HOVER OVER A FIXED SPOT ON THE EARTH'S SURFACE. THIS IS KNOWN AS A GEOSTATIONARY ORBIT AND IT'S WHERE COMMUNICATIONS SATELLITES ARE LOCATED. FROM THERE, A SATELLITE CAN "SEE" ABOUT ONE-THIRD OF THE EARTH'S SURFACE ... SUCH AS ALL OF NORTH AND CENTRAL AMERICA AND THE CARIBBEAN. NO MOUNTAINS OR BUILDINGS GET IN THE WAY BECAUSE FROM THAT HEIGHT EVERYTHING LOOKS FLAT. THAT'S FORTUNATE, BECAUSE ELECTRONIC SIGNALS TRAVEL IN A STRAIGHT LINE. ON EARTH THEY'RE STOPPED BY

MOUNTAINS OR BUILDINGS. FROM ORBIT, THEY CAN'T BE. SO THE IDEA IS TO SEND A SIGNAL FROM THE GROUND TO THE SATELLITE WHICH THEN RELAYS IT RIGHT BACK DOWN, BUT OVER A HUGE AREA WITH NOTHING IN THE WAY.

COMMUNICATIONS SATELLITES CAN BE USED FOR POINT-TO-POINT RELAY. THE TELEVISION NETWORKS DO THAT TO BRING IN NEWS REPORTS FROM, SAY, LONDON OR ROME TO THEIR NEW YORK HEADQUARTERS. MOST TRANS-OCEANIC TELEPHONE CALLS ALSO GO BY SATELLITE. BUT SATELLITES ALSO MAKE A DANDY MULTI-POINT DISTRIBUTION SYSTEM. CREATING A NETWORK ON THE GROUND REQUIRES HUNDREDS OF THOUSANDS OF MILES OF WIRE STRUNG ALL OVER THE MAP ... OR HUNDREDS OF EARTHBOUND RELAY STATIONS. A SINGLE SATELLITE REPLACES ALL OF THAT. AND THE ONLY COST INVOLVED IN CONNECTING WITH AN ADDITIONAL POINT ON EARTH IS THE RECEIVING EQUIPMENT OR DOWNLINK.

COMMERCIALLY AVAILABLE DOWNLINK DISHES NOW IN USE ARE ANYWHERE FROM 3 TO 10 METERS ... 10 TO 35 FEET ... ACROSS AND COST FROM 5000 DOLLARS UP. BUT THEY CAN BE MADE SMALLER AND CHEAPER ... PERHAPS 18 INCHES ACROSS AND 150 DOLLARS.

MULTI-POINT DISTRIBUTION BY SATELLITE IS VERY DEFINITELY A PART OF OUR FUTURE. IN FACT, IT'S A PART OF OUR PRESENT. ALL NATIONAL RADIO NETWORKS ARE EITHER ON SATELLITES OR CONVERTING TO SATELLITES FROM TERRESTRIAL DISTRIBUTION SYSTEMS ... THE TRADITIONAL WIRED NETWORK SYSTEM. TELEVISION NETWORKS USE SATELLITES, THOUGH NOT EXCLUSIVELY. CABLE PROGRAMMING, ESPECIALLY SPECIALIZED SERVICES SUCH AS HOME BOX OFFICE AND CABLE NEWS NETWORK ARE "ON THE BIRD." IN FACT, WELL OVER 50 TRANSPONDERS ALREADY ARE BEING USED BY CABLE AND BROADCASTING. AND THE NUMBER KEEPS RISING.

ADDITIONAL TRANSPONDERS ARE BEING USED FOR OTHER MULTI-POINT DISTRIBUTION PURPOSES. THE NATIONAL WIRE SERVICES ... ASSOCIATED PRESS AND UNITED PRESS INTERNATIONAL ... SEND MUCH OF THEIR MATERIAL BY SATELLITE. AS OF EARLY THIS MONTH, AP HAD 900 AND UPI HAD 700 DOWNLINKS AROUND THE COUNTRY. THOSE DOWN-LINKS, REPLACING TERRESTRIAL WIRED SYSTEMS, ARE SAVING AP AND UPI MILLIONS OF DOLLARS A YEAR. THINK WHAT COOPERATIVE EXTENSION COULD DO WITH SATELLITE DELIVERY OF NEWS RELEASES. FOR THAT MATTER, THINK WHAT COOPERATIVE EXTENSION COULD DO WITH SATELLITE INTERCONNECT FOR COMPUTERS IN DATA EXCHANGE.

UP TO NOW, SATELLITES HAVE NOT BEEN USED FOR MULTI-POINT DISTRIBUTION DIRECTLY TO THE HOME IN THIS COUNTRY BECAUSE DOWNLINK EQUIPMENT IS EXPENSIVE AND BULKY ... AND BECAUSE DIRECT BROADCAST SATELLITE ... DBS FOR SHORT ... HASN'T BEEN AUTHORIZED BY THE FCC. THAT WILL CHANGE SHORTLY. THE FCC HAS EIGHT DBS PROPOSALS UNDER CONSIDERATION RIGHT NOW AND PLANS TO APPROVE AT LEAST ONE ... MAYBE ALL ... BY SUMMER. THEN IT WON'T TAKE LONG FOR EQUIPMENT MANUFACTURERS TO BEGIN PRODUCTION.

TELEVISION BROADCASTERS ARE CONCERNED ABOUT THE POTENTIAL COMPETITIVE THREAT FROM DBS ... WHICH MAY EXPLAIN WHY CBS, RCA ... PARENT OF NBC ... AND HUBBARD BROADCASTING ARE ALL AMONG THE COMPANIES PROPOSING ONE SORT OR ANOTHER OF DBS. BY THE WAY, CBS'S PROPOSAL IS FOR HIGH-DEFINITION TELEVISION ... A WIDE SCREEN, HIGH RESOLUTION SYSTEM THAT'S CLAIMED TO BE THE EQUAL OF 35-MM MOTION PICTURE FILM. WHETHER CBS GETS ITS WAY WITH DBS OR NOT, HIGH DEFINITION TELEVISION TECHNOLOGY COULD BE A BOON TO THOSE WHO MAKE TRAINING TAPES.

SATELLITES ALSO COULD OFFER COOPERATIVE EXTENSION THE MEANS OF DISTRIBUTING AUDIO AND VIDEO PROGRAMMING, PERHAPS ON SOME SORT OF REGIONAL BASIS. FOR INSTANCE, I CAN IMAGINE SENDING VIDEO MATERIAL ... PERHAPS ENTIRE PROGRAMS ... TO LOW POWER TV STATIONS OR CABLE SYSTEMS. SIMILARLY, AUDIO PROGRAMMING MIGHT BE DISTRIBUTED TO RADIO STATIONS FOR USE ON THEIR REGULAR PROGRAMS OR ON AN SCA CHANNEL.

COMMUNICATIONS SATELLITES HAVE LITERALLY MADE POSSIBLE THE MODERN CABLE SYSTEM ... A BUGABOO FOR BROADCASTERS BECAUSE CABLE DEFINITELY IS CUTTING INTO TELEVISION'S SHARE OF THE AUDIENCE ... SO LET'S NEXT LOOK AT WHAT WAS BORN UNDER THE ACRONYM CATV.

CATV ... ORIGINALLY COMMUNITY ANTENNA TELEVISION ... BEGAN IN THE LATE 1940S AS A WAY OF BRINGING TELEVISION TO REMOTE LOCATIONS, THOSE BEYOND THE RANGE OF OVER-THE-AIR TV STATIONS. THE CATV OPERATOR PUT UP A BIG ANTENNA TO PULL IN THE SIGNALS FROM DISTANT STATIONS, THEN PIPED THE SIGNALS DOWN WIRES TO SUBSCRIBERS. FOR THIS, THE CATV OPERATOR CHARGED A FEE ... USUALLY A COUPLE OF DOLLARS A MONTH.

IN THOSE DAYS, TELEVISION TUNERS HAD ONLY 12 POSITIONS ... CHANNELS 2 THROUGH 13 ... SO CATV SYSTEMS WERE BUILT WITH A CAPACITY OF 12 CHANNELS.

SOON ENOUGH, SOME CRAFTY CATV PEOPLE GOT THE IDEA THAT THEIR SERVICE MIGHT BE EQUALLY WELCOME IN BIG CITIES WHERE RECEPTION WAS POOR BECAUSE THE TV SIGNALS WERE GETTING BOUNCED AROUND BY THE TALL BUILDINGS.

MEANTIME, THE FCC GOT THE IDEA THAT CATV SYSTEMS OUGHT TO CARRY MORE THAN JUST OFF-THE-AIR TV SIGNALS. THE IDEA OF LOCAL ORIGINATION ... AND PUBLIC ACCESS CHANNELS ... WAS BORN....

THEN CAME SATELLITES. SUDDENLY, A CATV SUBSCRIBER IN LOS ANGELES COULD TUNE IN A BALLGAME FROM ATLANTA, THANKS TO SATELLITE RELAY OF THE SIGNAL OF STATION WTBS. TED TURNER, WHO OWNS WTBS, ACTIVELY ENCOURAGED THIS DISTANT RELAY BECAUSE IT MADE HIS STATION WHAT AMOUNTED TO A MINI-NATIONAL NETWORK. AND HE COULD CHARGE ADVERTISERS ACCORDINGLY.

OTHER PROGRAM PROVIDERS ALSO SOON JUMPED ON THE CABLE BANDWAGON. AMONG THEM WERE THE PAY TV FOLK WHO SAW CABLE NOT ONLY AS A GREAT WAY TO GET THEIR SERVICES TO THE PUBLIC, BUT ALSO AN EASY WAY TO KEEP TRACK OF WHO WAS BUYING WHICH PROGRAM. YOU MIGHT BE INTERESTED TO KNOW THAT A PAY TV CABLE CHANNEL CAN TAKE A FULL CENSUS OF ALL THOSE TUNED IN EVERY 6 TO 10 SECONDS.

STILL OTHER PROGRAM SERVICES PROVIDE THEIR MATERIAL ON A DIRECT CHARGE TO THE CABLE SYSTEM. THE CABLE SYSTEM RECOUPS ITS COSTS THROUGH THE BASIC CHARGE IT MAKES TO ITS CUSTOMERS. AND STILL OTHER PROGRAM SERVICES ARE ADVERTISER SUPPORTED.

SOME SERVICES ARE DESIGNED TO HAVE A WIDE POPULAR APPEAL ... FOR INSTANCE, TURNER BROADCASTING'S CABLE NEWS NETWORK OR CNN. OTHERS ARE MORE NARROWLY TARGETED ... FOR INSTANCE, THE CABLE HEALTH NETWORK WHICH WILL GO ON THE AIR AT THE END OF JUNE. AND SOME ARE VERY NARROWLY TARGETED ... FOR INSTANCE, THE ALL-REAL ESTATE SERVICE NOW AVAILABLE IN ORANGE COUNTY, CALIFORNIA. IT'S ACTUALLY A CASE OF SHOP-AT-HOME FOR A HOME.

SHOP-AT-HOME, BANK-AT-HOME, AND SIMILAR SERVICES ARE YET ANOTHER KIND OF SERVICE WHICH CABLE CAN PROVIDE ... IF IT'S ON A TWO-WAY CABLE. THAT CONCEPT ... PIONEERED IN COLUMBUS, OHIO, UNDER THE NAME QUBE .... ALLOWS THE SUBSCRIBER TO TALK BACK TO HIS OR HER TV SET ... WITH THE KNOWLEDGE THAT THE RESPONSE WILL BE HEARD.

NEEDLESS TO SAY, THE OLD 12-CHANNEL CABLE SYSTEMS COULDN'T POSSIBLY HANDLE ALL THESE SERVICES. SO NEWER SYSTEMS ARE BEING BUILT WITH LARGER CAPACITIES. ONLY A FEW YEARS AGO, THE 50 CHANNEL CABLE SYSTEM WAS CONSIDERED BIG ENOUGH TO HANDLE EVERYTHING SUBSCRIBERS COULD WANT. NOW, THERE ARE PROPOSALS FOR SYSTEMS WITH 240 CHANNELS. ALL IT TAKES IS BIGGER WIRES.

CABLE SYSTEMS ALSO HAVE ADOPTED A CONCEPT KNOWN AS TIERING. FOR INSTANCE, THE BASE TIER, COVERED BY THE BASIC MONTHLY CHARGE, MIGHT INCLUDE THE OVER-THE-AIR TV SIGNALS CARRIED BY THE SYSTEM AND CONTAIN OTHER SIGNALS SUCH AS PUBLIC ACCESS OR PERHAPS A CITY GOVERNMENT OR SCHOOL SYSTEM CHANNELS. THE SECOND TIER MIGHT BE THE PAY TV TIER. AND THE THIRD TIER IS, SAY, SHOP-AT-HOME OR BANK-AT-HOME.

SPEAKING OF 240 CHANNEL CABLE SYSTEMS, TWO OF THE APPLICANTS FOR THE CABLE FRANCHISE IN SACRAMENTO, CALIFORNIA, ARE PROPOSING JUST THAT. THE MOST INNOVATIVE OF THE TWO PROPOSALS WAS PUT FORWARD BY CABLEVISION WHICH WOULD PROVIDE 120 CHANNELS FOR HOME USE AND 120 FOR INSTITUTIONAL USE. THE COST WOULD BE $19.50 A MONTH ... BUT THAT WOULD INCLUDE THE HOME BOX OFFICE PAY SERVICE AND A KEYBOARD FOR VIDEOTEXT. THE SYSTEM WOULD BE ARRANGED SO EVERY KEYBOARD ON THE SYSTEM COULD INTERACT WITH EVERY OTHER KEYBOARD ON THE SYSTEM. IN OTHER WORDS, ELECTRONIC MAIL.

By now, I imagine you've already started to see possibilities for Cooperative Extension in cable. Perhaps you're thinking that we could provide programming to an established service ... say programs on nutrition for the Cable Health Net. Or how about a videotext service on agriculture interconnected with two-way cable. And that's just a starting point.

There is one problem, though. How do we get material to the cable systems? Remember, there's just one system in each location. Each has exclusive rights to a certain territory. Of course, Cooperative Extension could go to satellite ... if it distributed to a large enough region to make that economically feasible. But wait, advertisers who want to buy time on cable systems are facing the same problems. So, cable interconnects are starting to pop up. Perhaps we could take advantage of such interconnects.

We've now roamed through alot of the electronic media and some of their potentials. What about print? That's the bailiwick of my colleague, Forrest Cress.

BY NOW YOU MAY BE FEELING THOROUGHLY SWAMPED BY FACTS, DATA, INFORMATION. INDEED, THE INFORMATION AGE IS HERE. THE QUESTION IS, WHAT TO DO ABOUT IT. AND THE ANSWER IS, THAT WILL DEPEND.

I'M NOT TRYING TO DUCK THE QUESTION. THE FACT IS, THE NEW TECHNOLOGIES ... IF YOU STILL WANT TO USE THAT TERM ... WILL DEVELOP AT DIFFERENT RATES AND IN DIFFERENT WAYS IN DIFFERENT LOCATIONS. FOR INSTANCE, SOME CITIES ALREADY HAVE CABLE PENETRATION OF BETTER THAN 80% WHILE OTHERS HAVE NO CABLE SERVICE AT ALL.

FOR THE NEXT FEW YEARS, ANYWAY, WE'RE LIKELY TO SEE MANY ATTEMPTS TO MAKE USE OF THESE NEW TECHNOLOGIES. AND WE'RE GOING TO SEE FLOPS AS WELL AS SUCCESSES. JUST IN THE PAST TWO MONTHS, TWO SPECIALIZED, SATELLITE-DELIVERED RADIO NETWORKS HAVE GONE BELLY UP. BOTH CBS AND ABC ARE IN THE BUSINESS OF PROVIDING SO-CALLED ARTS CHANNELS, CABLE SERVICES WITH A HIGH-BROW CULTURAL TONE. WILL THEY BOTH SURVIVE? WILL EITHER ONE SURVIVE? YOUR GUESS IS AS GOOD AS MINE.

WHATEVER HAPPENS TO SPECIFIC SERVICES, THE BASIC MEDIA WILL SURVIVE. I'M CONFIDENT THAT OVER-THE-AIR RADIO AND TELEVISION WILL STILL BE WITH US WHEN THE 21ST CENTURY DAWNS. SO WILL CABLE AND TELETEXT AND VIDEOTEXT AND ALL THE REST. THEY MAY NOT BE USED IN THE EXACT SAME WAY THEY ARE NOW. INDEED, IT'S A CERTAINTY THAT THEY WON'T BE. BUT THEY'LL BE AROUND, PROBABLY IN SOME SORT OF INTERACTIVE WAY, PROVIDING AN IMMENSE AMOUNT OF INFORMATION AND ENTERTAINMENT. AND THERE WILL BE CHOICE ... PERHAPS FAR MORE CHOICE THAN ANY OF US REALLY WANTS. FOR THAT REASON, SPECIFIC SERVICES ON THE MEDIA OF THE FUTURE

WILL BE MORE NARROWLY TARGETED THAN EVER BEFORE, EACH ONE TRYING TO APPEAL TO A SPECIFIC SEGMENT OF THE PUBLIC. INDEED, THE TRADITIONAL DEMOGRAPHIC STANDARDS FOR AUDIENCE MEASUREMENT ... AGE, SEX, INCOME LEVEL ... ALREADY HAVE BEEN JOINED BY WHAT ONE FIRM CALLS "PSYCHO-SEGMENTATION." THAT CONSULTING AND RESEARCH FIRM SORTS LISTENERS INTO PSYCHOLOGICAL GROUPS SUCH AS "LONELY SEEKERS OF COMPANIONSHIP" AND "AMIABLE CHEERFULS."

THE DAY OF THE BROADSIDE PRESS RELEASE, THE LITTLE-SOMETHING-FOR-EVERYONE RADIO TAPE IS GONE FOREVER. THAT IS BOTH A PROBLEM AND AN OPPORTUNITY FOR COOPERATIVE EXTENSION. IN THE FUTURE, WE MUST BE READY TO DEAL WITH A SPECIALIZED, SEGMENTED INFORMATION SYSTEM ... ONE OFFERING MANY AVENUES OF INFORMATION DISTRIBUTION, BUT EACH AVENUE POINTED AT A PARTICULAR SEGMENT OF THE PUBLIC. OUR INFORMATION VEHICLES ... AUDIO, VIDEO, OR TEXT ... WILL HAVE TO BE TAILORED TO THE OUTLETS ON WHICH THEY ARE TO BE USED.

IN NOT SO MANY YEARS, I CAN IMAGINE COOPERATIVE EXTENSION BEING DEEPLY INVOLVED IN AUDIO AND VIDEO PRODUCTION AS WELL AS TEXT BECAUSE THAT'S GOING TO BE THE WAY TO REACH THE PUBLIC. BUT TO MAKE IT ALL WORK, WE WILL NEED TO TAKE WHAT I CALL AN INTEGRATED, TIERED APPROACH TO COMMUNICATIONS.

THAT APPROACH BEGINS WITH THE BASIC QUESTION OF WHO SHOULD BE INTERESTED IN THIS PIECE OF INFORMATION AND WHAT'S THE BEST WAY OF GETTING IT TO THAT TARGET AUDIENCE? SHOULD IT BE SENT IN AUDIO, VIDEO, OR TEXT FORM? SOME COMBINATION? WHAT COMBINATION? THAT'S THE HORIZONTAL DIMENSION. THEN THERE'S THE VERTICAL DIMENSION. SAY THE DECISION HORIZONTALLY IS AUDIO. THE POSSIBLE CHOICES

VERTICALLY THEN MIGHT INCLUDE: A RADIO PUBLIC SERVICE ANNOUNCEMENT, A RADIO FEATURE OR NEWS STORY, A TELETIP TAPE, AN AUDIO CASSETTE FOR EACH COUNTY'S LENDING LIBRARY OF TAPES, AND PERHAPS HALF A DOZEN MORE. IF THE HORIZONTAL DECISION IS A COMBINATION ... SAY VIDEO AND TEXT ... THEN EVEN MORE DECISION-MAKING WILL BE REQUIRED TO ASSURE THAT WHATEVER COMBINATION OF COMMUNICATIONS CHANNELS IS USED, IT'S THE MOST EFFICIENT, MOST EFFECTIVE WAY OF GETTING THIS PIECE OF INFORMATION TO ITS INTENDED AUDIENCE.

QUITE OBVIOUSLY, DESIGNING AND CARRYING OUT COMMUNICATIONS IN THE FUTURE WILL BE COMPLEX AND DEMANDING TASKS. WE'LL NEED TALENTED, SKILLED COMMUNICATIONS STAFFS. ULTIMATELY, IT'S THEY WHO WILL TELL YOU WHAT THESE NEW TECHNOLOGIES MEAN TO COOPERATIVE EXTENSION AND WHEN AND HOW TO USE THEM.

Forrest D. Cress, Communications Specialist with the University of California Cooperative Extension Service spoke of new technologies and the print media.

NEW TECHNOLOGY AND THE PRINT MEDIA*

by Forrest D. Cress
Communications Specialist
Cooperative Extension
University of California

COMPUTER TECHNOLOGY REVOLUTIONIZED THE PRODUCTION OF AMERICA'S DAILY NEWSPAPERS DURING THE 1970's.

NEWSROOMS, ONCE BUSTLING HIVES OF AUDIBLE EXCITEMENT AND PRODUCTIVE TENSION, HAVE BEEN TRANSFORMED INTO STILLED CHAMBERS WHERE REPORTERS AND EDITORS NOW WORK AT THEIR DESKS IN QUIET ISOLATION, COMMUNICATING WITH A COMPUTER AND ONE ANOTHER BY MEANS OF INDIVIDUAL VIDEO DISPLAY TERMINALS (VDTs) AND THEIR SILENT KEYBOARDS.

GONE FROM THE MODERN NEWSROOM ARE THE CONSTANT CHATTER FROM BANKS OF TELETYPE MACHINES, PUNCTUATED SPORADICALLY BY THE STUTTERING FROM REPORTERS' TYPEWRITERS. WITH THEM WENT COPY PAPER AND PENCIL, AS WELL AS THEIR SUPPLIER--THE COPY BOY. THE COMPUTER, VDT AND THEIR CRONIES DID THEM IN. THESE PRODUCTS OF A NEW TECHNOLOGY AND THEIR PROGENY ARE HERE TO STAY.

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*PRESENTED AT A SEMINAR FOR COOPERATIVE EXTENSION ADMINISTRATORS: "HIGH TECHNOLOGY INFORMATION SYSTEMS: THEIR IMPLICATIONS FOR COOPERATIVE EXTENSION," SHERATON HOTEL, WEST SPRINGFIELD, MASSACHUSETTS, APRIL 20, 1982.

Reporters in a modern newsroom punch out their stories on VDT keyboards. Their copy moves through the editing and layout process and on to production and distribution without reprocessing--without their stories having to be reset in type.

Using a portable terminal and a modem--the gadget that plugs a computer into a telephone--many reporters today even prepare their stories in the field and then transmit them by telephone directly into their papers' computerized information storage and retrieval systems.

Land grant university information staffs in some states have added electronic news dissemination to their operations in order to access the computerized systems of their print media. They've used different approaches to do this.

For example, Michigan State feeds its news releases into its main computer on campus. The state's newspapers and Extension county offices can tap into the computer to get the news releases.

The University of Nebraska transmits stories directly to several daily newspapers.

Oregon State had a good thing going for awhile. It had been sending its stories electronically to the Associated Press Bureau in Portland for their dissemination by the wire service to Oregon's

NEWSPAPERS. WHEN ASSOCIATED PRESS' HEAD OFFICE GOT WIND OF THIS LAST SUMMER, IT SENT A MEMO TO ALL ITS BUREAUS RESTRICTING DIRECT INPUT INTO ITS SYSTEM TO ASSOCIATED PRESS STAFF MEMBERS AND EDITORS AND REPORTERS OF THE NEWSPAPERS SERVED BY ASSOCIATED PRESS. SO NOW, AT OREGON STATE, THEY'RE BACK TO PHONING IN THEIR STORIES TO THE PORTLAND ASSOCIATED PRESS BUREAU AND MAILING THEIR PRINTED NEWS RELEASES JUST AS THEY FORMERLY HAD DONE.

FEELING SOMEWHAT OUT OF TOUCH WITH THE TIMES IN CALIFORNIA, WHERE WE STILL RELY ON THE TELEPHONE AND PRINTED NEWS RELEASES TO REACH OUR PRINT MEDIA, I SURVEYED 72 NEWSPAPER EDITORS AND REPORTERS IN OUR STATE TO SEE IF THEY'D PREFER TO RECEIVE OUR INFORMATION ELECTRONICALLY.

TWO-THIRDS OF THE RESPONDENTS SAID THEY'D RATHER CONTINUE RECEIVING OUR INFORMATION AS PRINTED NEWS RELEASES. THEIR MAIN REASON WAS THAT THEY DIDN'T WANT TO CLOG OR OVERLOAD THEIR COMPUTERIZED SYSTEMS WITH OUR INFORMATION.

EDITORS OF THE MORNING AND EVENING EDITIONS OF OUR LOCAL NEWSPAPER--WITH A COMBINED CIRCULATION OF MORE THAN 130,000--SAID THAT THE BEST ELECTRONIC DEVICE AVAILABLE TO US IS AND WILL PROBABLY CONTINUE TO BE THE TELEPHONE.

THEIR POINT WAS THIS: THEY WANT US TO GET TO KNOW THEIR EDITORS AND REPORTERS AND TO CALL THEM IF WE HAVE A GOOD STORY.

IF THEY KNOW US, THEY'LL CALL US WHEN THEY'RE WORKING ON A STORY THAT AFFECTS OUR ORGANIZATION OR FOR WHICH WE WOULD BE A GOOD INFORMATION SOURCE. OUR PRINTED NEWS RELEASES, THEY ADD, ARE AS GOOD A WAY AS ANY TO SUPPLY REPORTERS WITH LEADS FOR DEVELOPING THEIR OWN STORIES.

AS A RESULT OF THIS SURVEY, OUR COMMUNICATIONS UNIT DECIDED THAT THERE APPEARED TO BE NO EXISTING ADVANTAGE OR NEED TO BEGIN TRANSMITTING OUR NEWS RELEASES ELECTRONICALLY TO OUR STATE'S PRINT MEDIA.

THAT WAS BACK IN JANUARY OF 1981. PERHAPS THE PICTURE HAS CHANGED. WE KNOW THAT THE TREND IN DAILY NEWSPAPER EDITORIAL DEPARTMENTS IS TOWARD GREATER RELIANCE ON ELECTRONICALLY RECEIVED INFORMATION TO FILL THEIR PAGES. BUDGET PERMITTING, WE PLAN TO SURVEY OUR NEWSPAPERS AGAIN THIS YEAR. ALL WE CAN DO AT THE PRESENT IS TO TRY TO FIGURE OUT HOW WE CAN BEST USE THE NEW TECHNOLOGY BEFORE THE DAY ARRIVES WHEN IT IS TO OUR ADVANTAGE TO DO SO OR BEFORE WE MUST IF THE PRINT MEDIA ARE TOUSE OUR INFORMATION.

TURNING TO THE MAJOR WIRE SERVICES OF OUR NATION'S NEWSPAPERS--ASSOCIATED PRESS AND UPI--BOTH ARE RAPIDLY PUTTING THEIR SATELLITE INFORMATION DELIVERY SYSTEMS INTO PLACE.

LAST MONTH, ASSOCIATED PRESS REPORTED IT HAS REACHED THE HALF WAY POINT IN BUILDING ITS SATELLITE NEWS DELIVERY SYSTEM.

EARTH STATIONS ARE RECEIVING PRINT AND AUDIO NEWS AT 450 NEWSPAPER AND BROADCAST LOCATIONS IN 48 STATES. MANY MORE ASSOCIATED PRESS MEMBERS ARE FED FROM THESE 450 SATELLITE RECEIVERS.

UPI SAID IT HAS COMPLETED ITS FIRST YEAR OF SATELLITE SERVICE TO AMERICAN NEWSPAPERS, INSTALLING 700 EARTH STATIONS AT SUBSCRIBER LOCATIONS AROUND THE COUNTRY.

ASSOCIATED PRESS' BOARD OF DIRECTORS HAS APPROVED 900 EARTH STATIONS. ALL ARE EXPECTED TO BE IN OPERATION A YEAR FROM NOW. MORE THAN HALF OF THE NEWS GENERATED BY THE ASSOCIATED PRESS IS NOW TRANSMITTED AND RECEIVED BY SATELLITE.

UPI PLANS CALL FOR A COMPLETE SHIFT TO SATELLITE DELIVERY OF ALL NEWS SERVICES, WITH AT LEAST ONE DOWNLINK IN EACH COMMUNITY IT SERVES.

ONCE ALL 900 OF ITS STATIONS ARE IN PLACE, ASSOCIATED PRESS EXPECTS THAT ITS ANNUAL DOMESTIC COMMUNICATIONS COSTS WILL BE $3.6 MILLION LESS THAN THEY WOULD HAVE BEEN WITHOUT THE SATELLITE SYSTEM. AS PHONE LINES ARE REMOVED, UPI ALSO WILL BE CUTTING ITS COSTS AND IS PROJECTING AN EVENTUAL 75 PERCENT REDUCTION ON ITS ANNUAL DOMESTIC LEASED LINE BILL.

ELECTRONIC DISTRIBUTION OF NEWSPAPERS HAS BEEN A REALITY IN GREAT BRITAIN SINCE 1975. TODAY, ITS TECHNOLOGICAL AND ECONOMIC FEASIBILITY IS BEING STUDIED IN SEVERAL JOINT PILOT PROJECTS BY U.S. WIRE SERVICES, MAJOR NEWSPAPERS, AND COMPUTER AND COMMUNICATIONS COMPANIES.

AMERICA'S NEWSPAPER PUBLISHERS ARE BEGINNING TO RECOGNIZE THAT THEY ARE IN THE BUSINESS OF PROVIDING INFORMATION, NOT SIMPLY NEWSPAPERS, AND ARE EITHER PLUNGING AHEAD OR AT LEAST LOOKING HARD AT DISTRIBUTING INFORMATION ELECTRONICALLY THROUGH VENTURES IN TELETEXT AND VIDEOTEXT. INFORMATION DISSEMINATED THROUGH BOTH CAN BE VIEWED ON A HOME TELEVISION SCREEN.

TELETEXT BROADCASTS INFORMATION DIRECTLY FROM ITS TELEVISION STATION DISSEMINATOR TO THE HOME TV SCREEN. A TELETEXT VIEWER, USING A DECODER ABOUT THE SIZE OF A POCKET CALCULATOR, CAN CALL UP AND SEE THE INFORMATION THAT THE BROADCASTER IS CURRENTLY SENDING--THE ELECTRONIC NEWSPAPER "EDITION" FOR THAT DAY.

FIELD ELECTRONIC PUBLISHING INC. AND SATELLITE SYNDICATED SYSTEMS ANNOUNCED LAST MONTH THAT THEY ARE CONSIDERING A JOINT VENTURE TO OFFER THE FIRST NATIONAL TELETEXT SERVICE IN THE U.S.

IF THE DEAL GOES THROUGH, THE PUBLISHING COMPANY'S TELETEXT MAGAZINE THAT HAS BEEN PROVIDING TELEVISED INFORMATION ON AN EXPERIMENTAL BASIS IN CHICAGO SINCE LAST APRIL WOULD BE MADE

AVAILABLE TO OVER 18 MILLION HOMES IN CONJUNCTION WITH THE SATELLITE DELIVERY OF SUPERSTATION WTBS-TV IN ATLANTA.

THE PROPOSED NATIONAL SERVICE WILL BE DEMONSTRATED LIVE VIA SATELLITE AT THE NATIONAL CABLE TELEVISION ASSOCIATION'S ANNUAL CONVENTION IN LAS VEGAS IN MAY.

TO RECEIVE THE PROPOSED SERVICE, SUBSCRIBERS WOULD NEED A TELETEXT DECODER TO DISPLAY THE MAGAZINE. ANY SMALL OR LARGE CABLE OPERATOR WHO RECEIVES THE SERVICE WOULD BE ABLE TO OFFER THE NATIONAL PACKAGE TO ITS SUBSCRIBERS AS SOON AS THE DECODERS BECOME AVAILABLE.

AMONG COMMERCIAL APPLICATIONS THAT HAVE BEEN PROJECTED FOR THE SYSTEM ARE TAXI COMPANIES USING IT FOR AIRLINE SCHEDULE UPDATES, REGIONAL MARKETING APPEALS, TIME-RELATED PRODUCT SALES SUCH AS YEAR-END AUTO SALES OR PRODUCT OVERSTOCKS, CLASSIFIED ADS AND ITEMIZATION OF PROFESSIONAL SERVICES.

LAST SUMMER, CBS AND TELIDON VIDEOTEX SYSTEMS OF CANADA SUBMITTED TO THE FCC IDENTICAL SETS OF PROPOSED TECHNICAL PARAMETERS AND RULES FOR TELETEXT WHICH THEY HOPE WILL BE ADOPTED AS THE STANDARD IN THE U.S. ITS ADOPTION WOULD MEAN THAT TELETEXT SERVICES IN THE U.S. WOULD BE COMPATIBLE WITH THE OTHER TYPE OF ELECTRONICALLY TRANSMITTED INFORMATION SYSTEM I WANT TO MENTION--VIDEOTEXT.

VIDEOTEXT PROVIDES THE VIEWER WITH INFORMATION ONLY WHEN HE OR SHE ASKS FOR IT ON A HOME COMPUTER TERMINAL. IT OPERATES BY MEANS OF TELEPHONE LINES CONNECTED TO A CENTRAL COMPUTER WHERE INFORMATION IS PERMANENTLY STORED. THE DIFFERENCE IS SIGNIFICANT BECAUSE THE DIRECT CONNECTION OF VIDEOTEXT MAKES POSSIBLE TWO-WAY COMMUNICATIONS BETWEEN THE HOME OR BUSINESS AND THE INFORMATION SUPPLIER.

SOMEONE WATCHING TELETEXT, FOR EXAMPLE, HAS THE ILLUSION OF BEING ABLE TO CALL UP INFORMATION FROM THE BROADCASTER BY USE OF A SMALL DECODER BUT ACTUALLY CAN ONLY SEE INFORMATION THAT THE BROADCASTER IS CURRENTLY SENDING AS PART OF THAT DAY'S ELECTRONIC NEWSPAPER "EDITION." A VIDEOTEXT SUBSCRIBER, ON THE OTHER HAND, GETS INFORMATION THAT IS TRANSMITTED TO HIS HOME OR BUSINESS ONLY WHEN HE ACTUALLY REQUESTS IT. VIDEOTEXT MAKES IT POSSIBLE TO OFFER FAR MORE INFORMATION THAN CAN BE BROADCAST. IT ALSO HAS AN ELECTRONIC MAIL CAPABILITY, CAN BE USED TO PAY BILLS AND DO SHOPPING FROM THE HOME, AND COULD EVEN BE EMPLOYED IN THE FUTURE TO CAST BALLOTS FOR ELECTIONS ON THE LOCAL, STATE OR NATIONAL LEVEL.

VIDEOTEXT CAME FROM PRESTEL, DEVELOPED IN GREAT BRITAIN. THE BRITISH POST OFFICE DEVELOPED A VIEW-PHONE, THE SERVICE THAT GAVE THE TELEPHONE USER A PICTURE OF THE PERSONS AT THE OTHER END OF THE LINE. BRITONS WERE COOL TO THIS IDEA. THE POST OFFICE, TEMPORARILY STUCK WITH A GADGET NO ONE WANTED, COMMISSIONED A SAM FEDIDA, AN ELECTRONIC GENIUS, TO FIND SOME WAY OF USING THE IDEA.

By combining the telephone line with TV and the computer, Fedida and his researchers came up with Prestel for homes and businesses.

Today's Prestel system is capable of providing up to 150,000 pages of information from 150 information services to more than 1000 subscribers, many of them businesses--in the London area. The information purchased ranges from hard news to entertainment. Soon, Prestel will expand from 150,000 to 500,000 pages or frames of information.(A frame is a 30-second display on the screen.)

What makes Prestel valuable to the subscriber is its versatility. It provides an electronic newspaper, weather forecasts, availability of hotel rooms, transportation schedules and travel conditions, readings from several libraries, university courses, football scores from America, a list of Guinness records and even a table of recommended restaurants, pubs and wine bars in London and in other English cities.

Major tests of videotext systems are under way across the country: Knight-Ridder Newspapers Inc. and Southern Bell Telephone in Florida offer Viewtron. Its package includes news, advertising and in-home shopping.

CompuServe, a time-share computer company owned by H&R Block, and 11 Associated Press member newspapers joined for delivery of an electronic newspaper to readers with home computers and

TELEPHONE ATTACHMENTS.

QUBE, THE FIRST INTERACTIVE CABLE SYSTEM MARKETED "IN THE U.S." IS PROVING HIGHLY SUCCESSFUL IN COLUMBUS, OHIO. LIKE VIEWTRON, IT USES ONLY A TELEVISION SCREEN AND A SIMPLE, NUMBERED KEYPAD, SO ITS INTERACTIVE POWERS ARE LIMITED. YET ITS RECEPTION HAS BEEN GOOD. COSTS ARE VERY LOW: $11 A MONTH FOR REGULAR PROGRAMMING AFTER A SMALL INSTALLATION FEE.

MEAD DATA CENTRAL INC. IS MARKETING AN ELECTRONIC NEWS RETRIEVAL SERVICE--NEXIS--THAT ENABLES VIEWERS TO RAPIDLY SEARCH OUT NEWS STORIES AND EVEN HAVE THEM PRINTED. SOURCES INCLUDE THE WASHINGTON POST, NEWSWEEK, THE ECONOMIST, REUTERS AND ASSOCIATED PRESS, AND ITS RESEARCH/RESOURCE CAPABILITY IS RAPIDLY EXPANDING.

THE LOS ANGELES TIMES MIRROR COMPANY, A MAJOR FACTOR IN TV AND CABLE TELEVISION TODAY, IS EXPLORING THE POTENTIAL OF VIDEOTEXT. TIMES MIRROR VIDEOTEX SERVICES ANNOUNCED IN JANUARY THE FORMATION OF A JOINT VENTURE WITH INFORMART OF TORONTO TO MARKET AND OPERATE CANADA'S TELIDON VIDEOTEXT SYSTEM IN CITIES ACROSS THE U.S. THIS NEW ENTERPRISE WON'T BEGIN UNTIL RESULTS ARE IN FROM A SEVEN-MONTH TEST OF THE SYSTEM THAT BEGAN LAST MONTH IN CALIFORNIA'S ORANGE COUNTY. THE TEST IS DESIGNED TO HELP DETERMINE WHETHER THERE COULD BE A MARKET BY ADDRESSING SUCH QUESTIONS AS:

WHAT KIND OF VIDEO TEXT SERVICES DO PEOPLE WANT?
WILL THEY PAY ENOUGH TO SUSTAIN A SYSTEM?
CAN MANUFACTURERS BUILD THE NECESSARY HARDWARE-DECODERS AND THE REST AT PRICES CONSUMERS WILL PAY?

I'VE BEEN TALKING IN TERMS OF THE PRESENT. LET'S TAKE A LOOK AT THE FUTURE--1990--AS FORECAST BY THE NATIONAL MARKETING RESEARCH AND ADVERTISING FIRM OF DOYLE DANE BERNBACH.

NEWSPAPERS: PUBLISHERS WILL BECOME SUPPLIERS OF INFORMATION FOR VIDEOTEXT AND TELETEXT TV SERVICES. INFORMATION SUCH AS STOCK QUOTATIONS, SPORTS RESULTS, MOVIE AND RESTAURANT LISTINGS AND CLASSIFIEDS WILL BE AVAILABLE THROUGH THE TV SCREEN, SUPPORTED BY ADVERTISING AND SUBSCRIPTION.

SATELLITE TRANSMISSIONS FOR NATIONAL EDITIONS OF SEVERAL MAJOR MARKET NEWSPAPERS WILL BE ADOPTED. NEWSPAPERS ALSO WILL USE SATELLITES TO ORDER AND SHIP ADVERTISING SCHEDULES.

THERE WILL BE MORE EMPHASIS ON SOFT NEWS AND LONG FEATURE ARTICLES, WITH SPECIAL LIFE-STYLE EDITORIAL SECTIONS TO SUIT LOCAL GEOGRAPHIC AND DEMOGRAPHIC INTERESTS. MORE LOCAL NEWS WILL BE PUBLISHED.

VIDEOTEXT WILL REPLACE TRADITIONAL SECTIONS OF THE PAPER.

SUBURBS WILL BECOME EASIER TO TARGET THROUGH GEOGRAPHIC EDITIONS OF METROPOLITAN PAPERS AND IMPROVED AVAILABILITY AND QUALITY OF SUBURBAN PAPERS.

FOR MAGAZINES: THERE'LL BE GREATER DISTRIBUTION IN THE FORM OF HOME DELIVERY AND NEW RETAIL OUTLETS INCLUDING DRUGSTORES, MASS MERCHANDISERS, DISCOUNT CHAINS AND DEPARTMENT STORES, IN ADDITION TO SUPERMARKETS. THE IDEA OF A MAGAZINE STORE IS LIKELY TO BECOME A REALITY.

THROUGH COMPUTER ADDRESSABILITY, THE PUBLIC WILL BE ABLE TO CUSTOM-TAILOR STANDARD PORTIONS OF MAGAZINE EDITORIAL SUBJECTS FOR SUBSCRIPTION.

PUBLISHERS WILL RECEIVE MORE REVENUE FROM READERS AS WELL AS ADVERTISERS. SINGLE COPY PRICES WILL REACH $4 BY THE END OF THE DECADE, AND THERE'LL BE GREATER PRESSURE TO KEEP THE RATE BASE ON TARGET WITH CIRCULATION.

FOR TELEPHONE DIRECTORIES: ELECTRONIC YELLOW PAGES, USING VIDEOTEXT AND TELETEXT TECHNOLOGY, WILL EMERGE VIA THE TV SCREEN, SUPPORTED BY ADVERTISING AND SUBSCRIPTION.

FOR TELEVISION: CABLE TELEVISION SUBSCRIBERS WILL REPRESENT 60 PERCENT OF ALL TELEVISION HOUSEHOLDS, WITH PAY CABLE REACHING 44 PERCENT OF ALL HOMES.

ALMOST ALL LOCAL OVER-THE-AIR TELEVISION STATIONS WILL HAVE A SATELLITE RECEIVING DISH, AND THE THREE MAJOR NETWORKS WILL USE SATELLITES FOR REGULAR PROGRAMMING DISTRIBUTIONS TO AFFILIATES. DISTRIBUTION OF SPOT TV COMMERCIALS TO LOCAL TV STATIONS ALSO WILL BE TRANSMITTED VIA SATELLITE. PUBLIC BROADCASTING WILL CARRY COMMERCIALS.

THERE WILL BE MORE THAN 9000 LOCAL CABLE TV SYSTEMS BY 1990, WITH MOST SYSTEMS OFFERING 34- AND 56-CHANNEL CAPACITY. SOME CABLE SUBSCRIBERS WILL HAVE 104 CHANNELS TO CHOOSE FROM.

DEVELOPMENTS FOR INTERACTIVE COMMUNICATION WILL ESCALATE. CABLE TV SYSTEMS WILL ALSO PROVIDE HOME SHOPPING AS WELL AS BANKING, BURGLAR AND FIRE ALARM SYSTEMS AS A REGULAR SERVICE FOR AN ADDITIONAL MONTHLY FEE. TWO-WAY VIDEOTEXT AND ONE-WAY TELETEXT INFORMATION RETRIEVAL IS ESTIMATED TO REACH 7 PERCENT OF ALL TV HOMES.

RETURNING TO THE PRESENT, TODAY'S VIDEOTEXT AND TELETEXT EXPERIMENTS ARE POPPING OUT QUESTIONS FASTER THAN SOLUTIONS CAN BE OFFERED:

WILL THE ELECTRONIC DELIVERY OF NEWS AND INFORMATION BRING NEWSPAPERS UNDER THE KIND OF FEDERAL REGULATIONS BROADCAST STATIONS NOW ENDURE?

How will the new electronic information be financed--by subscribers, by advertisers, by a combination of both, or in some entirely new way?

Will a two-way information delivery system change our economic system by making armchair banking and shopping possible and influence our form of government by allowing instant local and national votes on issues?

How will consumers be protected from misinformation and advertising disguised as news in a medium where legitimate news organizations may be only one of a number of information providers using a common distribution system?

What role will the editor play in a communications system that allows the consumer to be his or her own editor?

Until the questions about financing videotext and teletext systems are answered, subscribers will pay a high price for the information received. Most videotext experiments by newspapers in the U.S. have either been free to the consumer or relatively expensive. CompuServe users, for example, pay $5 for each hour of viewing.

Just as with any kind of new technology, the affluent, more educated citizens usually have an advantage over others in being able to adopt it earlier.

THE HIGH COST OF ELECTRONIC INFORMATION RAISES THE QUESTION OF WHETHER IT MAY BE A PRODUCT MAINLY FOR THE WEALTHY--ONE THAT WILL INCREASE THE KNOWLEDGE GAP BETWEEN THE "HAVES" AND "HAVE NOTS" IN OUR SOCIETY. SUCH A RESULT WOULD FLY IN THE FACE OF AMERICAN DEMOCRATIC TRADITIONS, INCLUDING THOSE OF COOPERATIVE EXTENSION. WE CAN SERVE THE PUBLIC BETTER IF WE BECOME "COMPUTER LITERATE." WE HAVE THE OBLIGATION OF BEING "COMPUTER RESPONSIBLE," AS WELL.

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Jim Hildreth is managing director of the Farm Foundation, Oak Brook, Illinois. Hildreth addressed his remarks to the institutional considerations necessary to prepare the Cooperative Extension Service for the 21st century.

THE COOPERATIVE EXTENSION SERVICE - INSTITUTIONAL CONSIDERATIONS NEEDED TO PREPARE FOR THE 21ST CENTURY*

R. J. Hildreth
FARM FOUNDATION

This paper reviews briefly the history of Cooperative Extension Service, especially with regard to delivery methods; analyzes the emerging scene; and explores some of the ramifications of high technology communication for extension in the future. The institutional changes suggested are marginal and not a grandiose institutional design for extension.

History

The 1914 Smith-Lever Act which launched the Cooperative Extension Service, has been amended often and was rewritten in 1953. Its basic purposes remain the same; "To aid the diffusion among the people of the United States useful and practical information on the subjects relating to agriculture and home economics and to encourage the application of the same." While not stated explicitly an underlying purpose of this diffusion of information is to help bring about changes in behavior and in the social and economic environment designed to promote well-being. It can be said that the extension purpose is to foster change in society -- change by individuals, households, firms, and governments.

Extension soon came to serve as a linkage between the agricultural research community and farm and rural people in the United States. New applied knowledge from the research community was delivered to farm and rural people and the research needs of farm and rural people were delivered to the research community by extension. This linkage continues to be a significant role of extension, even with changes in the audiences and the environment in which extension operates.

The major delivery method adopted early on by extension was the demonstration method, developed by Dr. Seaman A. Knapp. The demonstration approach has the learner observing a demonstration or trying out an activity. Knapp believed that though farmers would not apply methods developed by research, they would readily follow successful operations of a neighboring farm. Baker suggests that Knapp distrusted college professors and the demonstration programs developed in the South in the early 1900's kept their distance from the university. In contrast, county demonstration agents in the northern states were mostly college trained and worked in close cooperation with state colleges and farm organizations. Controversy about extension and its delivery methods is not new.

The Emerging Scene

In its early history the role of extension appeared straight-forward and limited. The informal education problems of agricultural production and rural living could best be attacked by extension. However, there have been dramatic changes in agricultural production, marketing and the rural communities which extension serves. Input supply firms develop and disseminate technical information on production practices for farmers. As the agricultural marketing system has evolved over time, there is increasing contact between representatives of the purchasing entities and producers. Extension is no longer confined to agriculture and rural life. Expertise to deal effectively with many of the problems incurred with the new audiences is not always available from the College of Agriculture. In programs dealing with urban youth and community resource development, extension is not the sole provider of educational programs.

The new audiences and new subject matter areas create stress for extension. First, the new demands for extension education have not been accompanied with sufficient resource increases to prevent a shifting of support from established programs to the new programs. This has been painful to many of extension's traditional clients. Second, even for the traditional programs, the diversity of the clients has increased greatly. Third, as extension has evolved a program for an increasingly literate and sophisticated group of traditional clients, the new audiences which include persons with low education and income levels are not well served by meetings and publications -- just as they were not useful when most farmers had low education and income. Fourth, extension education programs that were once innocuous may now be quite controversial. For example, research may indicate the use of pesticides as the best method of dealing with the gypsy moth or as a means of increasing agricultural productivity. This approach has been questioned by environmentalists and organic gardners. Many extension agents and specialists have been "blind-sided" by people with different perspectives on the problems under consideration.

The major principals of extension programming -- involving students in program development, presenting education in an informal setting and focusing on practical information -- remain the same. However, new delivery techniques have been developed. Extension has found the use of salaried aides and volunteer agents as highly productive. These aides have been used in nutrition education programs and small farm programs. The idea of voluntary leaders developed in the 4-H Program has been applied in using master gardeners for both urban and rural audiences. Volunteers and salaried aides, through their knowledge of the local community, and being locally based, can greatly expand extension's delivery capacity for the same budget.

Existing evidence about the value of extension in meeting the needs of society indicates that there is a positive, relatively high rate of return to society's investment in research and extension dealing with agricultural production and marketing. These studies suggest that extension education has been a very good investment for U.S. society, but they do not give much insight into the possibilities of improving the value of extension through changes in program delivery and organization. Careful studies have not been made of other programs of extension such as community development and home economics. Extension needs to think about the changes to be made for the future. What changes are needed to keep extension viable, efficient, and progressive?

One way to approach the question is to improve extension delivery efficiency. Funding for educational programs is positively related to demonstrated efficiency and effectiveness. Increasing demands for improved efficiency of extension come from both the input and output sides of the extension production function. Examples from the input sides are: increasing amounts of knowledge to be extended, transportation costs and personnel costs. Examples from the output side are the growing specialization of agriculture, the changing farm typology, the new audiences for extension education, and the growing complexity of decision making in agriculture and rural areas.

There are alternatives for the improvement of extension efficiency. Better targeting of programs to specific audience groups is an example. The nutrition education program, small farm programs, and large farmer programs are examples. The individuals in each of these audiences have

a more common knowledge background and thus their needs can be met with a less diverse extension program. The use of extension teachers with a higher human capital could also lead to efficiency gains. This can be achieved through increasing training of field staff. Another way to obtain higher human capital in the delivery of extension programs is to increase extension specialization. But in times of decreasing budget, the likelihood of significant expansion of state specialist ranks is slim. Alternatives include the development of regional or national specialists. The Rural Crime Center at Ohio is essentially serving the role of a U.S. specialist.

As the 21st Century comes into view, the extension system must consider how it will change, or lose the ability to act as a change agent. High technology communication is having significant effect on extension delivery methods. It can be one way of improving extension efficiency, i.e., obtain more output from the same dollar cost or obtain the same output with lower dollar cost.

High Technology Communication

The National Agricultural Research and Extension Users Advisory Board in its February, 1982 Appraisal of the Proposed Budget for Food and Agricultural Sciences dealt with high technology communication systems. They pointed out that extension workers became leaders in education in the 20's and 30's by being highly trained and placed in county offices. Through these agents, knowledge of new technology was transfered from scientists to users on many topics by using the communication methodology

of the time - personal contacts. They go on to point out that with the rapid advancement of knowledge in agriculture and nutrition, extending the availability of the advanced technology to users requires extension services to have highly trained specialists. They question whether the extension system can continue to support 3,500 local offices with highly trained specialists. They point out from state estimates for '78-'82, state staffs have declined in number by 10%. Area agents were reduced by 54% and county agents increased by more than 15%. They question the advisability of continuing this trend.

The recommend:

> "Rather, we recommend that the Joint Committee on the future of Cooperative Extension review the feasibility of restructuring State cooperative extension services to deal more effectively and comprehensively with educational programs and information delivery systems that have a strong focus on conventional agricultural activities. We recognize there are tradeoffs, between the use of electronic communication systems and professional State cooperative extension service staffs, which must be studied. By using new communications technology, it may be possible to reduce the number and to upgrade professional staffs at key levels within the State cooperative extension services. We invite comments from the Joint Committee on the Future of Cooperative Extension before we prepare policy recommendations for the Secretary of Agriculture to consider."

While not necessarily being in agreement with the Users Advisory Board, it is significant that this issue was raised by the Board. Cooperative Extension should consider seriously their ideas. This seminar is a useful first step in the process of looking at the issues and doing strategic planning for the future.

Extension will not be the only developer and user of high technology communication. Thus extension will have increasing competition for the time of the learners as the new technology reaches and is used by the public. Extension will have to keep its focus on education and not entertaining as it meets its competition. (I have often puzzled about how much of extension's ability to draw crowds to meetings in the past was due to extension being the only live entertainment around.)

With low technology communications (personal contacts) the gathering of learners and obtaining of financial support has come from county level programs. This has placed the county staff in a key and powerful position in the extension service. With low technology communication the county staff have been the gatekeepers of information flows. This position has led most county staff to view their county as the center of the world. I recall research done in the late 1960's by John Hutchinson, then Extension Director in Texas, for his thesis at the University of Chicago. He found that most county staff viewed their jobs as protecting "my people" from the state capitol, Washington, and extension headquarters. Extension administration philosophy and style has accommodated this reality. One example is the rhetoric of "grass roots", "bottom-up" program planning.

With the development and adoption of high technology communications, involving more state and national communication networks will come pressure for changes in administrative philosophy and style. Philosophic reorientation of county staff, as well as extension administration, will be quite important.

I do not enter the arena to decide if this is a good or bad situation. I do, however, point out that with large communication networks comes the danger of losing the ability to meet the educational needs of the individual. If that ability is lost, then all is lost.

High technology communication can well provide the opportunity to segment the students for educational endeavors. But networks may provide a temptation to move toward more generalized programming. The realities and opportunities of high communications technology will require a great deal of thought on how programs are built and delivered.

Extension has never been all things to all people at the same time. With high communications technology it will have to decide even more sharply what it is to whom and when.

The role of the private sector in agriculture science has grown. The mechanization of agriculture has long been dominated by private sector firms. When new technologies are embodied in physical products which can be patented and sold to farmers, private firms generally invest more, adapt research ideas quicker and get the technology used faster than the colleges or any public sector enterprise. The nearly complete monopoly

of new biological knowledge and technology for farmers which the colleges and USDA once had, is gone. There is promise of even further growth of the private sector role in biological research. The genetic engineering of plants is already so attractive to proprietary firms that they are now raiding U.S. university faculties. The coming revolution in information processing and communication technologies discussed here may well be dominated by the private sector. This raises serious questions about the future role of the public and private sectors as sources of knowledge for agriculture and rural areas. There will be tensions between the public and private sectors as the use of high technology communications grow. This reality calls for thoughtful and careful development of extension philosophy and approaches for the years ahead.

The development of regional and state networks could well lead to an opportunity for extension to more closely work with the research and resident instruction functions of the land grant universities. While there are many differences between the formal, classroom instruction function and the informal, extension education function, there are many parallels. Good teachers with the ability to cause students to learn are a scarce commodity. It is possible that the high technology communication systems may facilitate extension using excellent classroom teachers for specific educational undertakings. The trick will be to find out and communicate back to the excellent teacher in the classroom what it is the extension students want to learn about. Utter disaster could well occur if the high technology communication systems were used to push out what it is the teachers wanted to teach about, rather than what the students want to learn about.

It will also be possible to have researchers communicate directly with users of research by high technology communication. Not only could the researcher explain his findings, but users could access the data generated by the research. The idea of the Land Grant University could be more completely realized with high technology communication.

The changing clientele for extension and the increasing technical knowledge to be delivered to them call for more specialization. However, funds for significant expansion of state specialist ranks do not appear in sight. High technology communications may be a means of developing a cost-effective system through the use of regional specialists. The best prepared person on a specific topic or issue in the Northeast could be used, without great travel expense.

Much of the discussion of the extension users of high technology communication has been to deliver programs to extension learners. There is also a great opportunity for its use in in-service training of field staff. More effective training at lower cost could occur.

Concluding Comment

The challenges presented to extension by changing clientele, program needs, and high technology communication must be dealt with in a mode of increasing efficiency. Extension workers need creativity and imagination to fill the role of change agent through extension education where the needs continue to grow faster than funds.

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* The sections on history and the emerging scene draw heavily from: Hildreth, R. J. and Walter J. Armbruster, "Extension Program Delivery - Past, Present, and Future: An Overview", Amer. J. Agr. Econ. 63 (1981) 853-8

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Thomas G. Tate is a program analyst with the Program Development Evaluation and Management Systems, National Agricultural Library, Beltsville, Maryland.

He spoke about improving information management by using electronic communications and computers. The following paper outlines current technology uses and actions proposed by seminar participants.

Tate also sent a copy of the outline from a congressional hearing--Computer-Based Information Systems and Services for Rural America. It is included in this porceedings because it applies to much of what was discussed at the seminar.

HIGH TECHNOLOGY INFORMATION SYSTEMS:
IMPLICATIONS FOR COOPERATIVE EXTENSION

THOMAS G. TATE

PROGRAM DEVELOPMENT, EVALUATION AND MANAGEMENT SYSTEMS STAFF

SEMINAR FOR COOPERATIVE EXTENSION ADMINISTRATORS

SPRINGFIELD, MASSACHUSETTS
APRIL 20, 1982

IMPROVING EXTENSION INFORMATION MANAGEMENT THROUGH THE USE OF ELECTRONIC COMMUNICATIONS AND COMPUTERS

MISSION: TO IDENTIFY, DEVELOP, IMPLEMENT AND SHARE INFORMATION TECHNOLOGY THAT HAS PROVEN COST-EFFECTIVE IN EXTENSION PROGRAM MANAGEMENT AND PROGRAM DELIVERY.

- ASSIST STATES (PLANNING, EVALUATION, COORDINATION OF COMPUTERS, DATA BASES AND INFORMATION SYSTEMS)
- ASSIST NATIONAL STAFF IN COLLECTING, STORING AND RETRIEVING INFORMATION ON PLANNING, LEVEL OF EFFORT, ACCOMPLISHMENTS, AND IMPACT

CURRENT DEVELOPMENTS

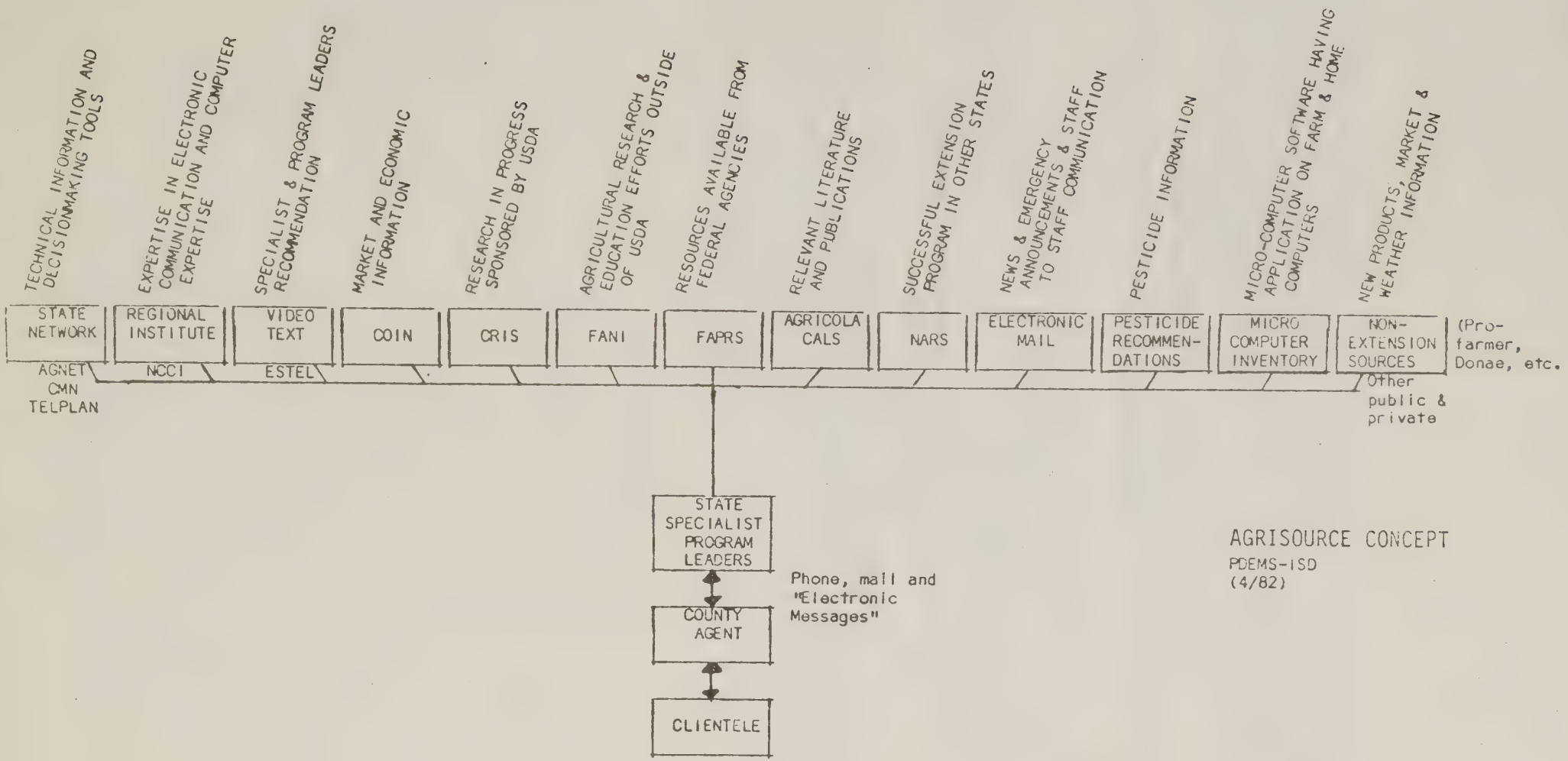
- NARRATIVE ACCOMPLISHMENT REPORTING SYSTEM (NARS)
- ELECTRONIC MAIL NETWORK
- EXTENSION ACCOUNTABILITY/EVALUATION SYSTEM
- BIBLIOGRAPHIC SYSTEMS (EXTENSION PUBLICATIONS)
- IMPROVING EXISTING SYSTEMS
  (4-H ENROLLMENT, EFNEP, COIN, ETC.)
- ACCESS TO RELEVANT NATIONAL DATA BASES (AGRI-SOURCE CONCEPT)
- MICRO COMPUTER UTILIZATION
  (SPONSOR NATIONAL INVENTORY, DEMONSTRATIONS)
- WORKSHOPS, SEMINARS, DEMONSTRATIONS
  (STATE, REGIONAL AND NATIONAL GROUPS)
- WORK WITH OTHERS, USDA, JOINT COUNCIL, ETC/PLANNING
- ASSIST ES STAFF ON OFFICE AUTOMATION
- PROVIDE STATES WITH TECHNICAL ASSISTANCE IN SYSTEMS DEVELOPMENT
- INVENTORY UNMET NEEDS OF CES AND NON-EXTENSION GROUPS
- SPONSOR & ENCOURAGE PILOT TESTS OF INNOVATIVE APPROACHES
  - COMPUTER BASED LIVESTOCK MARKET INFO (WEST)
  - QUBE INTERACTIVE TELEVISION (OHIO)
  - ESTEL VIDEOTEXT DELIVERY (MD)
  - COMPUTER SOFTWARE INVENTORY (FLA)
- OPERATE EXTENSION'S NATIONAL MIS - PRODUCING OUTPUT DISPLAYS ON REQUEST

PRIORITIES FOR IMPROVING CES PROGRAM IMPACT THROUGH USE OF PROVEN INFORMATION TECHNOLOGIES*

- CONSULT WITH CES ON SYSTEMS DEVELOPMENT
- ASSIST STATES IN ANALYZING ALTERNATIVES
- SERVE AS CLEARINGHOUSE ON INNOVATIONS
- DEVELOP SOFTWARE THAT CAN BE SHARED
- ASSESS EFFECTIVENESS OF NEW INFORMATION TECHNOLOGY
- IDENTIFY METHODS PROVEN COST-EFFECTIVE
- SPONSOR AND SHARE RESULTS OF PILOT PROJECTS
- GIVE HIGH VISABILITY TO SUCCESSFUL APPLICATIONS
- IDENTIFY TRAINING NEEDED TO UPDATE CES STAFF
- DESIGN/CONDUCT WORKSHOPS & SEMINARS
- SETUP MODEL DEMONSTRATIONS FOR HANDS-ON EXPERIENCES
- SHARE NEW DEVELOPMENTS (JOURNALS, NEWSLETTER, ELECTRONIC INVENTORY)
- IDENTIFY SOURCES OF INFORMATION RELEVANT TO CES & CLIENTELE
- NEGOTIATE ACCESS TO RELEVANT DATA BASES/SERVICES CONTROLLED BY OTHER U.S. AGENCIES & DEPARTMENTS & OTHERS
- SIMPLIFY ACCESS TO EXTERNAL INFORMATION SOURCES

*PROPOSED ACTIONS IDENTIFIED BY NORTHEAST EXTENSION ADMINISTRATORS DURING SEMINAR EXERCISE, APRIL 20, 1982; FOR IMPROVING COOPERATIVE EXTENSIONS USE OF INFORMATION TECHNOLOGY.

EXTENSION'S USE OF ELECTRONIC COMMUNICATIONS & COMPUTERS IN TECHNOLOGY TRANSFER



AGRISOURCE CONCEPT

PDEMS-ISD
(4/82)

COMPUTER-BASED INFORMATION SYSTEMS AND SERVICES

FOR RURAL AMERICA

Sponsored by

Subcommittee on Department Operations, Research
and Foreign Agriculture
of the
Committee on Agriculture
U.S. House of Representatives

May 19-20, 1982

At the request of Rep. George E. Brown, Jr., Chairman of the Subcommittee on Department Operations, Research and Foreign Agriculture of the House Committee on Agriculture, the Congressional Research Service assisted in developing this review of the role of information technology in providing a range of services for rural America, including future issues and policy implications of the use of these tools and techniques.

The membership of the Subcommittee on Department Operations, Research and Foreign Agriculture is:

George E. Brown, Jr., California, Chairman

Thomas S. Foley, Washington
David R. Bowen, Mississippi
Floyd J. Fithian, Indiana
Leon E. Panetta, California

William C. Wampler, Virginia
William M. Thomas, California
Pat Roberts, Kansas
William Emerson, Missouri
Cooper Evans, Iowa

The Subcommittee wishes to acknowledge the support provided in connection with this workshop publication and the planning and coordination of the entire hearing and workshop by professional staff members of the Congressional Research Service: Robert L. Chartrand, Senior Specialist in Information Policy and Technology, and Dr. A. Barry Carr, Specialist in Agricultural Policy. These activities were performed in close cooperation with Skip Stiles, Legislative Assistant, Office of Rep. George E. Brown, Jr.

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PROLOGUE

Our farm sector is rapidly entering the computer age, with all of the promise and problems that this progress entails. The application of any complex and sophisticated technology requires a great deal of thought and planning if success is to be attained. It is my hope that the hearing and workshop we are holding will contribute to that process.

We have brought together experts from Congress, the federal executive branch, state and local governments, universities, the farm sector, and the information industry, to begin a comprehensive discussion of the applications of computer-based information systems and services in agriculture. Over the course of the hearing and workshop, I hope that this group will provide some insight and guidance that will assist all of us in our future decisions on these technologies.

I would like to thank the Congressional Research Service, and specifically thank Robert Chartrand and Barry Carr, for their work in producing this pamphlet and for the weeks of work that went into preparing and arranging for this two-day session.

I look forward to an interesting and valuable discussion.

George E. Brown Jr.

I. INTRODUCTION

The ability of the agricultural community to fulfill the Nation's needs, and in some instances the further requirements of other countries, is contingent upon the farmers and ranchers using their resources most effectively. It could be safely said that the modernization of the world's agriculture requires the employment of modern information technology--computers, telecommunications, audio and video devices, microforms--and a systematic approach to their utilization.

Information technology can perform many useful services for those who comprise the rural community:

- o Speeding the transmission of information from the creator to the user;
- o Sifting selectively, according to user profiles, through vast quantities of available information to obtain the most relevant material;
- o Storing information, and in some cases raw data, so that concept terms and "keyword" indexes will allow rapid, precise retrieval; and
- o Facilitating the dissemination of needed information to individual and organizational users in the most expeditious fashion.

It has been shown, in recent times, that the traditional list of agricultural essential inputs--land, labor, and capital--must be expanded to include "information." An increasing number of persons in the public and private sectors now consider this to be the "glue" that brings all of these inputs together in a way that maximizes success. The importance of public investment in the production (research) and dissemination (education) of key knowledge is underscored in a recent paper by Nobel Laureate Economist Theodore Schultz. Entitled "Knowledge is Power in Agriculture," it stresses the criticality of promoting agricultural growth by improving the quality of farm people as economic agents. Those responsible for agricultural productivity must, in the present setting, draw upon the valuable lessons of the past even as they are stretching their horizons into the future. Bruce Catton wrote that:

> We are people to whom the past is forever speaking. We listen to it because we cannot help ourselves, for the past speaks to us with many voices...We cannot cut ourselves off from it. It is as real to us as something that happened last week. It is a basic part of our heritage as Americans.

This 1982 combined hearing and workshop embodies these realities and expectations, and has set forth three primary objectives:

1. Provide an opportunity for Members of Congress, their staffs, and activists in the public and private sectors to exchange ideas and experiences in this vital area.
2. Identify and discuss policy and program questions, and obtain realistic recommendations for later initiatives.
3. Increase public awareness of the potential benefits and limitations of advanced information resources and services.

II. BACKGROUND TO INFORMATION TECHNOLOGY SERVING RURAL AMERICA

A. Overview of Current Rural Applications of Technology-Supported Information Resources and Services

The introduction of innovative techniques and equipment into any environment must necessarily contain an element of the unknown, for there is an inherent resistance to change of any kind. The use of "technology" in communicating data and information from one point to another is not new, and can be traced back to the flaming Grecian torches, the French semaphore system, telegraphy, and the telephone. Now, in the 1980 decade, yet another group of proven and potential technologies exists which must be experimented with and assessed. Among this sophisticated array of "wizard machines" are the computer and various telecommunications systems.

In focusing on the application of such technology-supported systems to a range of farm-related functions and the identifiable needs of those in rural areas for more and better information, it is helpful to delineate the types of information which are required in the daily personal lives and business operations of those who farm and ranch:

1. Commodity and financial reports, including prices (current and future), market volumes, and trends
2. Crop and livestock control and management, featuring such activity-related data as pesticide use, feeding, and fertilizer utilization
3. Advice on marketing of produce and livestock, including legal and accounting ramifications
4. Information concerning government regulations and reporting requirements
5. Government services' (Federal, State, local) information
6. Agri-business bookkeeping guidelines and procedures
7. Weather data, emphasizing geographic proximity and currency
8. Emergency condition data (before, during, and after a disastrous happening)
9. Banking services, to expedite management and marketing activities
10. Retail purchasing (or "teleshopping")

In addition to these basic information categories which directly affect the farmer in his daily work, there are other types of information which are useful in family matters and often enrich their lives:

- Educational offerings
- Library-related material, including abstracts and reviews of books and articles of interest
- Recreational systems (computer games, etc.)
- Information on international developments affecting farm operations and planning
- Community service information

Since new information systems are generated as the result of a clearly urgent need as expressed by the users, or come about due to an entrepreneurial

belief that there is a market for them, experience has shown that their usefulness should be assessed regularly. In his book Society as a Learning Machine, former Science Advisor to the President Dr. Jerome Wiesner pointed out that "any learning process requires feedback of information for a comparison of the accomplishment with the goal." With the advent of on-line technology, this monitoring can be achieved much more easily than in the past.

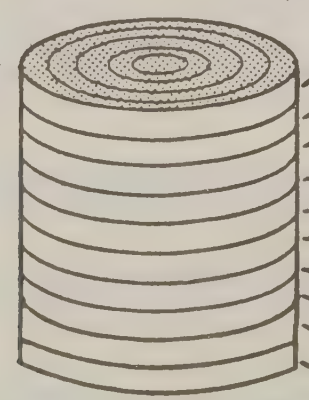
The technologies now being used operationally to disseminate information to more remote areas are but the leading edge of more advanced systems. With the impressive advantages gained through the miniaturization of components, both in computers and telecommunications, and the continuing trend toward less expensive configurations, the number of individuals and organizations able to purchase or lease the new systems grows apace. Government and society alike are being changed as a result of these developments. A thought-provoking observation on this phenomenon was made by the late Marshall McLuhan:

> The medium, or process, of our time--electronic technology--is reshaping and restructuring patterns of social interdependence and every aspect of our personal life. It is forcing us to reconsider and reevaluate practically every thought, every action, and every institution formerly taken for granted.

It is apparent to those developing as well as using the evolving information resources and services that the integration of the new devices and techniques into established routines will take time, and in many instances will cause unanticipated changes in the ways of doing things. This calls for careful thought to be given to the scope and nature of the orientation sessions where new users first hear and learn about how the systems work, what is expected of them as users, and to whom they can turn for assistance when problems occur. The importance of good training and follow-through user assistance procedures can never be overstated.

B. The Stakeholders Involved in Advanced Information Systems for Rural America

Any examination of the groups involved in the creation, maintenance, and utilization of technology-based information services designed to support the farming and ranching communities reveals a diverse set of private and governmental institutions, as well as individuals and families. These include:



- Individual or family-owned farms and ranches
- Agri-business corporations
- Newspapers
- Television and radio stations
- Banks
- University and college agricultural departments
- Town and county governmental units
- Telephone and satellite utilities
- Federal, State and local extension services
- Associations and farm organizations

Each of these has a special stake in the effective introduction and functioning of better rural information systems. Quite often, there are interlocking activities which, if properly carried out, can serve to benefit several of the participating groups simultaneously. There will be times when communication--in the traditional sense--will be improved, perhaps to the same extent as when the telephone became widely used. In terms of the marketplace, particularly the handling of crops and livestock, the timeliness of information afforded by these services can be vital.

Just having more information is not, of course, the answer to everyone's problems, but new action alternatives may come to light. Norman Cousins offered this philosophical and yet basically practical comment, saying that in a computerized age "there may be a tendency to confuse logic with values, and intelligence with insight." Those with a real need for better (and sometimes more) information must be ready to go through an "educating" process of sorts. This may involve a shift in priorities, including how time is spent and specifically what types of information are critical to the management of their operation. Any change involves an element of risk, but as Peter Drucker (in Management Science) counselled nearly 25 years ago: "... while it is futile to try to eliminate risk, and questionable to try to minimize it, it is essential that the risks taken be the right risks."

C. Chronology of Selected Events

To place some perspective on where information technology is today, particularly as it relates to agriculture, a brief review may prove beneficial. Since information technology has been evolving continually for many years, the following is a selected sampling of significant events that reflect or have influenced the utilization of various information systems by American agriculture.

1743 The American Philosophical Society, the earliest society in the United States to promote scientific agriculture, was organized.

1790 The New England Farmer by Samuel Dean, which became a standard textbook on American agriculture, was published.

1792 The Old Farmers Almanac was founded and published by Robert Thomas at Sterling, Massachusetts. It is one of the oldest running periodicals in the United States

1831 Many schools and colleges began to offer courses in agriculture and sciences helpful to agriculture.

1837 Samuel Morse developed the first practical telegraph machine and filed for a patent.

1839 Congress appropriated $1,000 to the Patent Office for collecting agricultural statistics, conducting agricultural investigations, and distributing seeds. Library was established which later became the National Agricultural Library.

1840 For the first time the U.S. Census included questions on agriculture.

1860 First "pony express" mail route between St. Louis and Sacramento

1862 President Abraham Lincoln signed legislation which created the U.S. Department of Agriculture.

1862 President Lincoln approved the Morrill Land-Grant College Act.

1875 Frank Baldwin was granted first U.S. patent for a practical calculating machine that could perform four arithmetic functions.

1876 Alexander Graham Bell invented the telephone.

1895 Guglielmo Marconi invented the wireless telegraph.

1914 The Smith-Lever Act formalized cooperative extension work.

1920 KDKA (Pittsburg) became first successful radio station.

1925 Charles Jenkin invented the television.

1946 Eckert and Mauchly invented and developed first all-purpose, all-electronic digital computer, the Electronic Numerical Integrator and Calculator.

1958 President Eisenhower broadcasted first voice transmission via satellite.

1959 Computer-tabulated farm record/management systems begun by Michigan State University and several other Land-Grant Universities.

1960 Tiros satellites sent back pictures of hurricanes and cloud movements.

1973 Low cost, limited capacity "micro-computers" were introduced.

1975 TELCOT system for computerized marketing of cotton created with 15 users buying terminals in Lubbock, Dallas, and Memphis.

1976 National Agricultural Library combined all bibliographic data bases into on-line AGRICOLA system.

1979 Green Thumb, videotext information delivery system for farmers, started in Kentucky as test project under sponsorship of Kentucky Extension Service and U.S. Department of Agriculture.

1980 Computerized system for sale of livestock begun by Eastern Electronic Marketing Association with 23 terminals throughout the Eastern seaboard.

III. WORKSHOP ISSUES, THEMES, AND QUESTIONS

A. The Broad Issues of Information Technology in Agriculture

One can hardly pick up a farm magazine today which does not contain an article about computers for the farm. The wide array of computer hardware and software available to farmers can provide assistance for nearly every task on the farm. Dr. Robert Kramer of the Kellogg Foundation predicts that three-quarters of the commercial farms and 90 percent of the county extension offices will be equipped with computers or intelligent terminals by 1990.

While these predictions may seem far-fetched to some people, the information technology revolution is impacting the farm sector right now. The electronic technology exists now. Literally hundreds of people at universities, on farms, and elsewhere are at work developing software and data collections to utilize this technology.

Computer owners agree that the biggest drawback is finding useful programs. For while minicomputers are within the price range on most farmers, without proper programming the units are worthless. It takes not only hardware and software, but also human and financial resources to build and market a viable computer based information system which works. Systems should provide more than just basic information. Successful systems also provide the means for analysis of information in ways which assist farmers in their management decisions.

The penetration of computer-based information technologies onto the farm scene raises some vexing social questions for policy makers. Proponents of computer based technology, such as William Norris of Control Data Corporation, have praised its ability to equalize opportunity by delivering information and services to rural areas or to limited resource farmers. Taking advantage of this technology, however, depends not only on the availability of hardware, but also on the presence on the farm or in the rural community of people trained to accept and use it. Promoting equality in this dimension is a major challenge.

The proliferation of computer-based information technology available in the home may have important consequences for the future of the family farm. The effects of these developments may be positive. But people have raised troubling questions about possible negative impacts. These questions lead to a basic policy issue which is yet to be resolved: At what point in the system may an individual gain access to desired information, from which resource, and at what cost?

The emergence of new information technologies may also have important consequences for traditional agricultural information institutions. Will new information systems be used to increase the capacity of the county extension service to serve farm and nonfarm clients, or will they replace the traditional extension delivery system for certain types of information? Will the adoption of new information technologies require Extension to make tough choices about the audiences it will serve? Should State institutions copyright and franchise their software or do they have an obligation to share it with others? Will the important role of farm magazines and other publications be diminished?

A number of institutional issues will have to be confronted before real progress can be achieved. First, the appropriate role for the Federal government in information technology research and development merits reevaluation in view of changing conditions. Second, the role of Federal and State agencies in training personnel to use the new technologies should be defined. Third, the development of approaches to improve cooperation between the various Federal and State agencies involved in information technology deserves consideration. Fourth, the need for standardizing the components of information technology should be explored.

These and other issues are among those to be considered by the six workshop groups during these two days. The lessons learned from these efforts could be useful in undertaking the important task of building a coordinated national policy for the development and use of computer-based information technology for agriculture.

B. The Workshop Focal Areas

Working within the context of the preceding commentary, the six workshop discussion groups are being asked to engage in more detailed exploration of their respective focal areas. The ensuing report from each group should include a succinct identification of issues and goals, any reflections on the impact of technology (where appropriate), commentary on such matters as public-private sector roles and responsibilities, and recommendations for possible initiatives by Congress, other governmental groups, or the private sector. Some of the key questions to be considered are listed below.

1. GROUP I - Private Sector Information Services

- Will the charges imposed by private sector information providers constitute a barrier for use by the small farmer?
- Can private sector information vendors provide "original information" of the requisite accuracy, completeness, and timeliness, or must they rely (at least in part) on governmental groups?
- Does the range of information required by the farmer and rancher exceed the capacity of existing private sector providers, and if so, what kind of "networking" arrangement is feasible to fulfill such needs?
- To what extent do rural information users require "value added" information which has involved human expert interpretation and repackaging?
- Under what circumstances should there be formal private-public sector collaboration in the provision of information services?
- Will private sector information entrepreneurs strive to develop and offer "user friendly" systems which can optimize ready use by a wide variety of persons in the rural community?
- What provisions for user "feedback" are projected by private sector information providers, so that responsiveness to changing needs can be facilitated?

2. GROUP II - Government Information Services: Management and Marketing

- How can information system design minimize the requirement for hardware acquisition by the user? Are systems being designed which give a particular hardware vendor a captive market?
- Are there formal procedures to insure that system capacity is being used to provide the highest quality analytic routines and the most valuable information, or is this determined by "who gets there first"?
- Is user feedback used effectively to weed items from the data base and to determine priorities for additions to the system?
- What arrangements are needed to minimize duplicative system development efforts among the various State systems and to make State systems compatible with each other?
- What knowledge and skills are necessary to design a statewide computer-based information system? Do traditional Extension organizations possess individuals with these capabilities?
- How does a computer-based information system compare in cost effectiveness with traditional Extension information delivery systems? For the institution? For the user?
- Are rural communication networks of adequate quality to assure access for all potential users of a statewide computer-based information system?
- Will computer-based information systems replace traditional supply channels for certain types of farm inputs or traditional marketing channels for certain farm commodities? What are the implications of this for the farm sector, the input sector, and the marketing sector?

3. GROUP III - Government Information Services: Crop Operations

- Does the existence of a publicly supported information and management system discourage the development of innovative private sector systems?
- Are there beneficial ways for public systems and private management information vendors to cooperate in serving the same market without giving someone an unfair competitive advantage?
- Is there justification for a user fee in public systems or should access be free?
- Should access to publicly financed systems be open to all or should access be controlled to prevent misuse of the information?
- Does the information provided in the system require professional interpretation before it can be used? Who should provide this interpretation?
- What liability is incurred by the information provider for the effects of the recommendations or information provided through the system?

- Will computer-based information systems replace traditional Extension delivery systems for certain types of information in a way that reduces access to certain segments to the public? How will limited resource clients be served?

4. GROUP IV - User Requirements

- In what ways can user requirements for various information support systems -- interactive, straight data delivery, modeling, calculation -- be ascertained initially?

- Can information entrepreneurs, either governmental or private sector, hold meetings which will serve to orient and educate potential system users regarding the benefits and limitations of computer-supported information systems?

- Should those providing advanced information services develop mechanisms which can quickly monitor changing user requirements?

- Has thought been given to distinguishing the types of products and services required in order to meet various categories of user needs for information?

- Have users of projected systems, in declaring their information requirements, fully understood the cost-performance tradeoffs?

- Should preliminary surveys of community information needs, as perceived by various potential user groups, be undertaken, since oftentimes there is great variance between what is thought to be needed and that which is actually significant?

- Could sample "profiles" of needs be created, during a "pilot" system test period, in order to guide both the information providers and the subsequent user community toward the most responsive service?

5. GROUP V - System Implementation: Hardware Installation, Training, Maintenance, Software and Data File Modification

- What options can be offered potential on-line system users in the way of hardware and software?

- Will there be a quick response, through telephone consultation or site visit, by a system engineer when service is curtailed?

- Can customer awareness of enhancements to the system be ensured both by displayed notices (on the terminal) and through printed releases?

- Are user "brush up" sessions planned, either through on-line instruction sessions or by special seminars held in community centers which allow group sharing of problems?

- How can user requirements for additional data bases best be ascertained and met by information providers?

- Should newly offered data files, especially those with crossover points to existing on-line files, receive special treatment in terms of user awareness and acceptance?

- Is there a necessity to have a "local" system support person on call during the early phases of offering an operational service?

6. GROUP VI - Present and Projected Technology

- Has experience on several "pilot" projects proven that selected information can be disseminated on a cost-effective basis to those in remote areas?

- Is there known continuing research and development in information technology which holds promise of special benefit for rural users?

- Should farmer-servicing organizations (associations, etc.) consider conducting colloquia and demonstrations to further enlighten potential users living in non-urban areas?

- Is a review of existing government-sponsored information services, including those featuring the use of computers and telecommunications, warranted at this time?

- Should the standardization of information systems, in order to facilitate networking between a number of separate services, be considered by the government or some private sector group?

- Is there sufficient system utilization data, based upon systematically conducted surveys, to determine cost-performance alternatives for customers in the farming community?

- Are there user-identified areas where information not currently available should be considered for on-line creation and accessibility?

IV. ILLUSTRATIVE ON-LINE INFORMATION SYSTEMS

As the need for improved information support has emerged in various quarters of the agricultural community, computer-based systems utilizing telecommunications networks have been developed by corporations, universities, associations, and the government. In many cases, these are still in the testing stage as providers and users collaborate in assessing what types of information are required, can be provided feasibly, and how much such support will cost. Other technology-oriented services are now fully operational, and while these often are being modified as better software becomes available and other data files are added, they represent an increasingly reliable foundation upon which the farm users can rely.

1. AACSys -- Two years ago, the American Farm Bureau Federation began development of a program designed to meet the marketing information needs of its members. Known as "AACSys", this pilot marketing information project currently involves eight State Farm Bureaus and over 200 farmers in those states. AFBF members can retrieve information from host computers via telephone hookup and, at the same time, can send messages to state computers, thereby providing a two-way, daily contact between state coordinators and farmer-members. According to reports by state coordinators, farmer reaction has been quite positive, indicating that the proper type of information is being provided.

2. AGNET -- This "Agricultural Network" is a time-sharing information delivery system providing assistance in problem solving of agricultural management questions, information sharing (tracking market conditions and trends), and communications in the nature of an electronic mail service. In serving users in more than 40 states, AGNET offers programs which can provide information and a calculating capability in such areas as: livestock and crop production, grain handling, marketing and finance, and home economics.

3. AGRICOLA/CRIS -- The National Agricultural Library of the USDA provides comprehensive access to information on published literature and on-going research in agriculture through two information retrieval systems, AGRICOLA and the Current Research Information System (CRIS). The AGRICOLA system contains worldwide coverage of published books, serial titles, and journal articles on agriculture and allied subjects. In addition to bibliographic citations of published literature, the system offers information through several specialized subfiles including BRU (brucellosis file), ENV (environmental impact statements covering 1977-78), and FNC (Food and Nutrition Information Center with emphasis on human nutrition research and education, and food technology). CRIS provides USDA/State documentation for publicly-supported agricultural and forestry research in the United States. Through this retrieval system, an individual can determine the nature of the research, along with the investigators' names, performing organization and location, and a list of the latest publications resulting from the research.

4. AGRISOURCE -- The "Agrisource" system approach developed by the Computer Corporation of America in conjunction with the Agricultural Extension Service would provide users with access to geographically dispersed and heterogeneous information systems. Some representative data bases include

USDA's AGRICOLA, Current Research Information System (CRIS), and the Food, Agriculture, Nutrition Inventory (FANI) which contains information on all Federal food, nutrition and agricultural programs currently in progress. Other sources of information found in the Agrisource system are the National Newspaper Index, the Smithsonian Science Information Exchange (SSIE), and FEDREG, a database containing Federal regulations, proposed rules, public law notices, and Presidential proclamations on a variety of subjects, including agriculture.

5. CHASE ECONOMETRICS -- Chase Econometrics, a subsidiary of Chase Manhattan Bank, offers access to information in the areas of industrial economics, energy, minerals, international economics, U.S. economics, and agriculture through its information system. Data on agribusiness provides coverage of activities at the international, national, regional and statewide levels. Subscribers receive regular reports and analyses, and also have access to a number of historical and forecasts' data bases acquired through internal data collection activities or from other organizations.

6. CMN -- Developed by Virginia Polytechnic Institute and State University as a national information system for use by state extension services, the "Computerized Management Network" assists Extension workers in solving problems, retrieving information, and evaluating programs. To date, many CMN programs have provided the foundation for several highly successful extension programs. Two of the most popular are: the Simplified Dairy Cattle Feeding Program which has had a substantial impact of the economics of feeding dairy herds; and the OUTLK program which provides low-cost user access to USDA reports on marketing, futures, and summary information on all major crops and livestock enterprises. The CMN system is designed to be used by non-computer oriented individuals and is currently accessed by more than 500 users in 44 states and Canada.

7. EMA -- The Electronic Marketing Association, Inc. of Christiansburg, Va. first offered its computerized auction system for cattle and lambs in 1980. Through a telephone hookup to computer terminals in any location, buyers and sellers are brought together at a specific time to determine the price, on a competitive basis, for the animals being offered for sale. The EMA system permits prospective buyers to obtain written descriptions on the animals several hours before sale time. During the auction itself, the computer drops the asking price until a bid is received, then continues from that point. At the end of a sale, a high bidder receives a summary of his purchases plus a summary of the entire sale; all bidding is strictly confidential.

8. ESTEL -- The University of Maryland's Cooperative Extension Service plans to offer a videotext information service, ESTEL, to area farmers in the near future. Although the system is not yet fully operational, the Extension Service is currently sponsoring a pilot demonstration project to potential users in Somerset County. ESTEL will offer market reports, futures prices, and local weather conditions, along with news bulletins and recommendations from the Extension Service. Access to the two microcomputers located at the University of Maryland and in Somerset County will be via telephone and home television sets.

9. FACTS -- The "Fast Access Computer Terminal System" is a distributed data base system located at Purdue University in Indiana. Currently, some 200 users access FACTS to obtain weather reports, consumer information, agricultural news, and agribusiness analyses.

10. FIRSTHAND -- Based on French videotext technology known as "Teletel", the First Bank System of Minneapolis introduced its FIRSTHAND system late last year. This fully transactional videotext system began with placement of 15 pilot terminals in the rural area outside Fargo, North Dakota, and by mid-1982, 285 terminals should be in place in rural and suburban homes, and small businesses. FIRSTHAND information--such as agribusiness bookkeeping systems, weather, commodity and financial reports, and domestic and international news--will be accessed through a local telephone number. Additionally, clients will be able to execute financial transactions or obtain retail services, advertised products, commodity reports, and other agribusiness information offered by a half-dozen other information providers.

11. GRASSROOTS (TELIDON) -- Frittsco, Inc., the holding company of The Bakersfield Californian, and Infomart, a Canadian firm, recently announced the "Grassroots" project which will provide electronic videotext information services to agriculturally-related industries in the San Joaquin valley sometime in 1982. The joint venture will be based on Telidon technology developed by Canada's Department of Communications, and will draw on the experience of the Grassroots system currently used in Manitoba. The Canadian project is the first commercial videotext system in North America serving the agribusiness community with comprehensive, up-to-date information. As envisaged, the California Grassroots project will offer three basic areas of service, including: essential agribusiness information such as weather forecasts and frequent reports from commodity markets; interactive transactional features such as financial analysis models, banking, and purchasing; and general news items and entertainment features.

12. INSTANT UPDATE -- Located in Cedar Falls, Iowa, "Instant Update is a time-sharing information delivery system designed for the Professional Farmers of America. The system offers its users a variety of services and information, including electronic mail, agribusiness news and analyses, weather reports, and technical information.

13. RURAL VENTURE -- Beginning with a project in Princeton, Minnesota, Control Data Corporation has addressed the problems of America's small farmers by joining with other organizations to form a joint endeavor, "Rural Venture." The CDC system offers courses and data and recommends solutions in an effort to promote economic efficiency in small-scale agriculture and food processing enterprises. Specifically, a Rural Venture project provides the capability for computer-optimized selection of crops, livestock, and equipment, as well as a full-range of computer-based education and training programs. CDC plans to repeat the Princeton undertaking on a nationwide basis and anticipates selling the Rural Venture technology to Federal, state, and local governments to assist administrators in solving local problems.

14. SCORPIO -- This information retrieval system of the Library of Congress for more than ten years has provided automated access to a large number of items in the Library's collection. Through searching various

files in the SCORPIO system, users can obtain bibliographic citations to books, journal articles, and government documents covering a wide array of subjects. Another SCORPIO file contains information on Federal legislation introduced since 1975, while the National Referral Center Master File (NRCM) lists more than 12,000 organizations and individuals qualified and willing to provide information on topics primarily in science, technology and social sciences.

15. THE SOURCE -- Providing access to more than 1200 programs and services in a variety of subject areas, THE SOURCE information system of Reader's Digest offers data of particular use to the agricultural community. The Commodity News Service, for example, features general news reports and daily price activities for 22 commodities. The system also supplies news and commentary on current business trends along with updated listings of stocks, bonds, commodities, and futures.

16. TELPLAN -- Michigan State University designed the timesharing information delivery system called TELPLAN. The system offers agribusiness news and consumer services to approximately 400 users.

V. INFORMATION TECHNOLOGY IN THE SERVICE OF AGRICULTURE

Much has been written about the present "Age of Information," and the emphasis has often been on the array of electronic devices which can store, process, retrieve, and distribute information at incredible speeds and in a variety of forms. Exactly 30 years ago one of the great pioneers in the development of computers, Samuel N. Alexander, penned this modest forecast:

> These expanded electronic information processors may then come to be regarded as one of the significant inventions of our time. They may enable science, industry, and government to tackle large-scale complex problems which heretofore could not be handled very effectively in the time allowed.

This prediction certainly included the American keystone industry of agriculture. Foremost among the modern technologies which work with information is the computer. For the purposes of this workshop, this technology can be categorized as: interactive systems, videotext systems, and "free-standing" small (or micro) computers for use in offices or on the farm. Each of these was designed to fulfill a known, specific user need, hopefully at a minimum cost. To broaden the capabilities of these specialized devices usually results in reduced efficiencies and increased costs. A few words regarding these three basic classes of computers which can be used in rural America:

- o Interactive computer systems have existed for 20 years, and involve medium to large computers with a powerful computational and information access capability. "Connect time" generally is protracted and involves utilizing fairly extensive telecommunications systems and more sophisticated terminals.
- o Videotext systems usually feature small to medium-sized computers and are designed to provide a wide range of information to many users at a low cost. Connect times tend to be short and generally involve only local telephone systems connections and lower cost terminals.
- o Microcomputer systems on site in offices or on farms can meet the data processing needs of most users, and in addition can interface with large time-sharing systems and many videotext systems. Thus, the user has access to many kinds of information which can be adapted to meet farm or office needs.

The availability of quality software is of equal importance to the user community, and must be a vital factor in the selection of a computer system. The applicability of the software to the specific needs of the farmer or rancher, or other rural user, should be explored fully before deciding upon the purchase or lease of a system. Careful analysis of the <u>combined</u> hardware and software capabilities being acquired, including the trade-offs in performance and cost, is essential.

VI. ALTERNATIVE METHODS OF FOSTERING CONGRESSIONAL INITIATIVES

As the Nation has moved into the Age of Information, its leadership including those in the Congress has become aware of the spectrum of opportunities open to it insofar as the utilization of information technology is concerned. In many instances, newly developed tools and techniques have proven to be equally valuable for those living in the cities and their counterparts in rural areas. Increasingly, however, the special needs of the farming and ranching communities have been recognized, and the importance of creating information services which could address these needs accepted. Whether focusing on farm-related marketing information, weather data, crop planting and care guidance, or assistance in farm management, those responsible for the welfare and future of the farming community have raised this key area among their priorities. Within the Congress, there has been a burgeoning determination to understand better the value of information services for the national rural constituency. This has necessarily entailed the orientation of legislative personnel regarding which technology existed, how it could be employed, who the potential users were, and when such services could be offered by either governmental or private sector providers. A number of initiatives, open to the Congress, designated Federal executive branch agencies and departments, State and local governments, or various private sector organizations, merit consideration. These delineated action options must be viewed, of course, within the context of established congressional oversight functions and protocols, and the traditional ways in by which Members interact with the legislative process.

Several methods of undertaking legislative initiatives, which constitute specific courses of action, may be identified:

1. Introduction of new legislation -

   - o Identify roles and responsibilities for selected public and private sector organizations having missions and resources relevant to technology-supported information services for the agricultural community.
   - o Establish a special study commission or task force to explore identifiable user information needs and potential response systems and services.
   - o Authorize, where necessary, the utilization of contractor personnel and services to augment in-house capabilities in this area.
   - o Provide for the establishment and operation of a support information capability, such as a clearinghouse or network, that could collect, index, store, process, and make available (both electronically and in more traditional forms) requisite data for known user communities.
   - o Mandate the utilization, in specific activity areas, of appropriate information technologies and man-machine techniques.

2. Review of existing legislation - may occur as a result of individual Member action, or during the deliberations of the budget, authorization, or appropriations committees in regard to:

- o Adequacy of Public Law goals and provisions, from the vantage point of proven program performance.
- o Perceived effectiveness of present agency or department program implementation, especially as concerns cost-performance measurement (where appropriate) and hind-sight assessment of initial project objectives.
- o Possible redirection of departmental implementation and interpretation of directives, conducted through high level executive branch (OMB) action.

3. Analysis of sunset legislation - past valuable initiatives, often forgotten with the passage of time, merit review lest useful analyses of the problem are lost or existing information resources and services already in place be seriously diluted or unthinkingly removed.

4. "Jaw-boning" (persuasion) of responsible Federal executive branch departments and agencies - the varying roles within the Federal establishment (OMB, ED, USDA, NSF) often are diminished or become minimal over time; legislative interest often reinforces the resolve to evaluate anew appropriate organizational frameworks, budgeting goals, program objectives, use of technology, and the implications of applying modern technology to the needs of user groups.

5. Utilization of legislative research and analysis capabilities - by calling upon the extensive resources of the Congressional Research Service, Office of Technology Assessment, General Accounting Office, and Congressional Budget Office (as appropriate), Congress can commission studies of varying scope and depth that then may be applied to selected congressional review or foresight activities.

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Maynard Heckle, Director of the New Hampshire Cooperative Extension Service was the first speaker at the plenary session: "Knowing All of This -- What Should We Do?"

This is a transcription of an audiotape of Heckle's comments, recorded during the conference.

Knowing All This -- What Should We Do?

Maynard Heckle, Director
Cooperative Extension Service, New Hampshire

One interesting note at the start, is that the President of the United States has now returned to radio to get his message across to the American people. Sort of interesting, at this time of high electronic technology. Whether or not he will be effective using this media is yet to be seen but it is ironic that with all of our discussions of modern technology, that the President has now returned to the radio in hopes of reaching the American people.

I do think that this has been an excellent opportunity for us to take this glimpse into the future, and to look at some of the very relevant trends which obviously are going to impact upon Extension programs and on the lives of our citizens in the years ahead. At the same time we had an overview of all the various alternatives that are available to us in the electronic field to draw upon as we attempt to make some necessary changes to be more responsive.

So these are just a few thoughts about application, and some concerns I have about the selection of new technology, and the adoption of new technology to the Extension educational process.

First of all, I think the session that we had on Futuristic Thinking, and Futuristic Thought and Concern, relates directly to our total program development process. I think that as we look into the future, we can arm ourselves with appropriate data, direction that can help all of us stretch our minds and stretch the minds of the many citizens we have involved in the decision-making process. Over the years we have taken

advantage of situation and trends data, to make decisions in relation to programs. But I think it's important how we select the kinds of information that we use, and how we put it in a framework that is understandable and usable at the local level. Then, the local citizens can relate some of these broader national and international developments to their local situation.

My experience suggests that sometimes it has been difficult to make this relationship. It's sometimes difficult for our field staff to make the relationship between national, regional and state trends, and how they impact on a county situation. We certainly have the challenge of making the most effective use of this futuristic kind of thinking to help our staff and our citizens who are involved in Extension programs use this information in decision-making.

Another dimension that I feel is important is clearly defining the Extension educational process. Just what it is -- what has made Extension education effective? What has caused it to continue over the past 60 or 70 years and continue to get response from local citizens? What are those key elements in the Extension education process that we should understand and focus upon? Then, when we look to new and significant ways of further extending our educational efforts, we try to incorporate these new approaches along with those things that we consider to be a basic strength to Extension education. I am concerned that we may get too sophisticated. We run the risk of becoming so sophisticated that we may lose some of those elements of the Extension educational process that are unique, that give us our fundamental strength. And this is why I get concerned when we talk so much about technology transfer. To me, that's a pretty cold

kind of notion. Technology lacks some of the elements of Extension education that we feel are important. Maybe it's just a hang-up on terminology, but I feel that there are many organizations, groups and individuals outside Extension that see getting information out as our function. "If you can zip that information out in a more efficient and effective manner, and reach more people with that information, then that's the answer." Maybe they lose sight of some of the basic strengths of Extension education.

Along with this is the importance of the human element in the Extension education process. I think this is the most important ingredient. I'm not saying that we would necessarily lose this human element as we advance and develop more sophisticated techniques, but I think it is important for us to keep this very much in mind. We shouldn't overlook the human element in the Extension education process.

I think we also have the challenge of selecting and applying new technology within our available resources, both human and physical. On the human side, I'm thinking of people who at the present time are not motivated to take full advantage of some of our new technology. What do we need to do to try to motivate that group, while we are quite selective in terms of our limited resources? Where do we invest our dollars, and in what ways?

Closely related to this is the importance of how staff are brought along as we move into the era of more advanced and sophisticated technology. It is important to bring staff along gradually in the adoption of new technology, so they can see they pay off, resulting in personal and

professional satisfaction from such adoption. Currently we have many ways of extending information that many, many of our staff are not using yet because it's just a little inconvenient, or it's different, and they just don't have the time to do it that way. They'd much rather continue in ways they feel they've been effective over the years, in ways that they gained both professional and personal satisfaction. So we've got a real challenge to take this human capital, and move it gradually into adoption. We're going to have some people that are way out front and we're going to have some people who are never going to adopt the new technology. And we're going to have a large number that are in-between -- that are going to be looking both ways. This to me is one of our greatest challenges. And it gets back to this notion of "demand/pull" rather than "technology/push" or "demand/push." We're going to have a little of that "demand/push" too -- "you ought to be doing these things" -- "you ought to be taking advantage of this new method, and that new method." People are not going to be quite that responsive. Of course, a lot of them are, but there's a majority that are still questioning and wondering about some of the things available today, to say nothing about things that will be available in the future. I think we have to be conscious of this, and keep in mind the effect of this inter-generational response to new technology. It is very real. We all recognize this, but I think we have to keep it in mind as we move ahead.

My closing comment is that as we look ahead to new technology and the adoption of new technology, we are really back to the old diffusion process. We are going to have to move our people and our selves through the traditional steps of the diffusion process. This, in essence, was a

session dealing with awareness, making a lot of us more aware of what is available. Then we move to the interest stage and then on to the trial stage. This is where I think we ought to think more about the demonstration technique, to get all of us more acquainted with our new technology. Then we go through this trial period before final adoption. As we look at our staff and our selves we're going to also fall clearly into the various groups in the diffusion process. We've got our early adopters -- young staff who are gung-ho and want to move out; we've got the large majority who are still sort of looking both ways; and then we're going to have a group of non-adopters, who haven't picked up on many of the new techniques over the years. I think we have to accept this. My focus, then is the human element, both in terms of preserving our common interest in people as clients as we develop more sophisticated techniques, and also our concern with people in our own organizations.

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job with somebody, putting a lot ... years. Then we move to the ... stage ... pilot. ... executive ... Similarly. Then we go through this trial period before final ... of our staff ... ourselves we're going to also talk ... us in the diffusion process. We've got ... some staff who are ... and want to move out; we ... the large ... who are ... looking both ... continuing to have ... of non-adopters, who haven't adopted any ... of the new techniques over the years. I think we have to focus ...

My focus, then is the human element, both in terms of ... interest in ... as we develop ... and staff our ... people in our ... organization ...

... method, ... still questioning ... today, ... really back to ... process. ... traditional view of the diffusion process.

Dan Moore is Associate Professor, Rural Sociology, Kellogg Fellow, Pennsylvania State University. He was a speaker at the final conference session, summarizing what was learned, and looking forward to the next step.

Extension and Computers: Issues for the Coming Decade

Dan E. Moore
Associate Professor of Rural Sociology and Extension Specialist
Department of Agricultural Economics and Rural Sociology
The Pennsylvania State University

I am very happy to be here with you and to react to a very informative seminar. Certainly computers, telecommunications more generally and their creative applications, are unquestionably important and timely topics. I believe these topics are particularly important for you who give leadership to the Cooperative Extension Service. The "computer revolution" holds the potential for profound changes in the way we carry out our Cooperative Extension programs.

I came to the seminar this week with two relatively different sets of credentials which may qualify me to react to these presentations. First of all I have had some experience with computers, mainly in my compacity as teacher. While at Cornell University I taught a course in computer applications to students who were not majors in Computer Science. In teaching this course I came to appreciate the fears and concerns of the "non-expert". I believe one of the major issues in instituting advanced technology in our extension system is to help existing staff overcome their fears of the "magic" involved in using this technology. I will come back to this point at the end, but in no activity is there a closer relationship between being completely ignorant of a process and being a confident user. In using a computer, once you have performed an activity or program twice, you are an expert. If we can help people move across this barrier we will have come a long way in intelligent application.

The second thing which may qualify me to speak to the issues of this seminar is that I have been associated with the Cooperative Extension Service for a

long time, in fact, more than thirty years. My father was a county agent in Ohio while I was growing up. When I was in undergraduate school he finished his doctorate and became an Extension Specialist. Yesterday we discussed the difference in orientation toward extension programs at the county level compared to the state level. I have jokingly said many times that I was almost twelve years old before I knew that "damnedspecialist" was two different words. I won't tell you the words I thought went with "extension administrator." Seriously though, by having experienced the extension system from the county and state level and from watching my father struggle with some of the first steps at using computers in farm record-keeping programs, I do have some perspective on the issues. One of Dad's concerns was and continues to be that we have a tendency to over-promise when it comes to actually delivering extension activities related to the computer. Therefore, even though I am an avid computer user I also carry around a certain amount of skepticism about the ability of computers to "save us."

Background

Computers have been present, particularly in the research side of the land grant enterprise, for a number of years, but it is my impression that enthusiasm for the applications of this technology has waxed and wained over this period of time. What is it that makes the current situation different and, from my point of view, more propitious? There are a number of reasons why I think the time is right. First of all the equipment that we have available to us is more reliable and has a greater capacity than any of us can imagine. Right now I have a microcomputer on my desk that has more computing power than the main frame computer at the University of Wisconsin had when I was a graduate student in the 1960's. For less than $5,000 each extension office and, indeed, each farmer can

have this capacity at their fingertips. A second reason that I am optimistic about our ability to successfully engage this technology is that many of our staff already possess the computer literacy and the enthusiasm to use what is available. A third reason is that these computer and telecommunication networks are what the industry calls "user friendly." This means that with a minimum of training even a novice can interact with systems--not only micros on the desk tops, but remote data bases and information systems. We are no longer in the situation where a practitioner or agent must deal with the computer through a programmer. We have all had the experience of dealing through programmers who may be adept at manipulating the computer but not so adept at understanding our problems. In contrast, today, all one has to do to use many of the existing systems is to know how to read. Years of training in computers are not required. This is not to say that proficiency does not take some time, but it is possible for most of us.

I am confident that the current technology and the technology which seems to be immediately on the horizon will serve our needs. My biggest question is whether or not we have the vision to use this technology in creative ways. My concern is that we may become so infatuated with computers that we forget that our business is serving people and helping them solve problems. As we have seen this week it is very easy to be overwhelmed by the technology. How do we turn it around and make the technology our tool to solve and to deliver our programs and ideas? In what follows I will organize my comments around three major topics. First, I will provide a brief conceptual model to organize what I think are the relatively distinct applications within the Extension system. Second, I will review a recently completed experiment in Kentucky called Green Thumb, which may provide some lessons for each of our respective states. Finally, I

will outline a series of issues that I think we must consider as we go forward with computers and Extension.

Heuristic Framework

I find it useful to think of two dimensions or two sets of issues in attempting to sort through what computers can do for Extension. In Figure 1 these issues are outlined. The first dimension has to do with what I call functional activities. A second dimension has to do with the audience towards which these acitivities are directed. In turn, each of these dimensions has two parts. Activities may be separated into, first, management and administration, and second, substantive programs and information delivery. Under audience I would point to the Extension system and Extension staff, on the one hand and clientele or audience on the other.

Figure 1 illustrates the relationship between these two major dimensions, function and audience. If we look at Cell 1 we can see that for administrative purposes within the Extension system itself there are several activities that have been going on for a number of years which can be a focal point of our activity right now. The effective use of management information systems can be enhanced if we have the vision. Computers at each county office connected by phone lines to the University not only allow us to enter extension management information directly to a larger mainframe, but it also provides a data base for local agents to monitor their activities on a daily basis. To me one of the exciting possibilities in linking information systems is the ability to build in program evaluation and program accountability. For example, creative analysis of existing information on 4-H members is now, in most instances, not possible because the individual members' records exist only on 3 x 5 cards or single

Figure 1. Heuristic Framework for Thinking About Computers in Extension

Audience	Function: Management and Adminstration	Function: Program and Information Delivery
Staff	MIS Evaluation, Accountability Office, secretarial 1	Staff training information base 2
Clientele	4	3 Videotext Problem solving

sheets of paper in each county office. If we had this information in machine readable form, it would be very easy to analyse characteristics of first year members, of five year members. It would also be possible to compare the characteristics of drop-outs with those who continue for a longer period of time. We have had this information on a sporadic basis whenever larger research studies have been undertaken. What I am talking about is the ability for each county, indeed each 4-H staff member, to monitor their own program.

I have heard the concern expressed in many corridors that it will be necessary to "sell the computer to county staff members." I believe there are a lot of forces in motion which will facilitate this selling process. First, I think there are enough opportunities for office efficiency to justify and to convince county staff of a computer's usefulness--even necessity. If we would begin our training on computer uses with secretaries in county offices and demonstrate the efficiency of producing form letters and mailing lists by a computer, half the battle would be won. It is important that we demonstrate that the computer does not necessarily replace people, but more importantly it enhances their productivity. My major point with regard to Cell 1 of Figure 1 is that there are enough opportunities for the creative use of computers within the extension system in the area of management and administration to more than justify computer introduction.

Even though much of our discussion about computers leaps over to Cell 3 in the table and relates to the potential for delivering programs to farmers and others, I believe it is essential to appreciate the opportunities and necessity for staff training and staff enhancement (Cell 2 of Figure 1). I have suggested that staff members at all levels of the system can benefit from the evaluation opportunities provided by more rapidly retrievable administrative records. But

another important potential is for educating staff members about new ideas, products and procedures. There may be some direct delivery via computers to clients, but I predict that we will continue to deliver most of our programs through county staff, but those staff can be better able to respond if they can interact not only with a favorite specialist at the University, but also with an information base that is nationwide, even worldwide. I have observed data bases on pests and pesticide application that make leafing through a book to key out an insect highly anachronistic. Although much of our attention must be focused on questions and issues of program delivery to clientele, an important set of issues must be: who will program the computers? Who will keep the computers up-to-date? Who will be on the scene locally to respond to clientele questions? Who will educate the clients? We must have extension staff who are conversant not only with subject matter areas but also with computer and telecommunication systems as an important new media for communicating.

Most of the current discussion about computers and extension centers on Cell 3 in my figure. Cell 3 represents the delivery of programs and informati to clientele with the involvement of computer and telecommunications tech Even here there is some confusion. This confusion could be clarified ing of computers in two ways. On the one hand we need to think of the co as a tool for the delivery of programs. On the other hand we must consider diffusion or the delivery of the tool itself; that is, the diffusion of the com puter as an information and problem solving technology for farmers and other extension clientele. I believe that extension has a limited role in promoting the tool, "selling" computers. I am not convinced that we can compete effectively with commercial vendors, and this concern may even extend to delivering software. I believe our most important activity is to use the computer as a tool by which to deliver programs and information.

As we deliver these programs and information we will obviously need to be involved in the generation of some software and in the evaluation of that software. However, I believe our basic job is in educating people for problem solving. One of the important ways that information can be delivered is by putting textual material out over a television set. Many communities have cable systems which now permit the local entry of textual information. This mechanism will obviously become more important in the future, but it offers, in my view, a rather limited elaboration on educational television as we have known it in the last twenty years. I believe that the important advance that is on the horizon now is the possibility for a user to interact with these information systems. By interacting I mean that the user can search through a large menu of available information, find the information of concern and continue to probe in this data base for more and more detailed information. In the most sophisticated systems the sender and the television client can actually interact electronically. The sender can ask questions of the user and the user can interact directly on the t.v. screen or on a delayed basis through the electronic mail system.

One of the concerns about educational television and other mass media approaches to extension has been that mass media reduces the all-important face-to-face relationship between the educator and the user. While the interactive communication system will not be face-to-face, it will permit many of the important attributes of face-to-face relationships. I believe we must keep this interactive potential of future computer systems in mind as we move to incorporate this new technology into Extension.

The Green Thumb Experiment

Perhaps one of the best ways to discuss the potentials and the limitations of a video-text system is to briefly outline the major results of an experimental program in Kentucky called Green Thumb.[1] Green Thumb in Kentucky was an experimental videotext system linking farmers and their families to a computer information system. The information was linked to the Green Thumb computer at the University of Kentucky via county extension office computers, telephone lines, and home television sets. The information came from a variety of sources and focused on weather, markets, farm production technologies, and family related topics. The two hundred farm families in the experiment used a key pad, a home computer terminal (Green Thumb boxes), a telephone, and a television set to call their local Extension office number and retrieve "frames of information" that they selected from a menu of informational items.

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[1]The following discussion draws heavily on an executive summary of the Green Thumb project prepared by Claude F. Bennett, Program Analyst and Contract Manager for the Green Thumb evaluations, Extension Service, USDA. Copies of the evaluations of Green Thumb may be purchased from:

Sales Desk
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

Citations for the two evaluation reports are as follow:

Paul D. Warner and Frank Clearfield, "An Evaluation of A Computer-Based Videotext Information Delivery System for Farmers: The Green Thumb Project" (Executive Summary only--32 pp. Final Report including Summary, Conclusions, and Recommendations--approx. 195 pp.); Department of Sociology and Cooperative Extension Service, University of Kentucky, Lexington, KY 40546.

Donald Case, Milton Chen, Hugh Daley, Joung-Im Kim, Nalini Mishra, William Paisley, Ronald E. Rice, and Everett M. Rogers, "Stanford Evaluation of the Green Thumb Box Experimental Videotext Project for Agricultural Extension Information Delivery in Shelby and Todd Counties, Kentucky" (Executive Summary only--17 pp. Final Report including Executive Summary--107 pp.); Institute for Communication Research, Stanford University, Stanford, CA 94305.

Two thirds of the users reported that they were satisfied or very satisfied with the Green Thumb project, especially given its experimental nature. About half of the users reported technical problems in using Green Thumb at one point or another and about two thirds found some of the information "too old" to be of use to them. They would have liked to have seen more frequent updating of the information. The issue of updating is important for our considerations about future systems. Not only does it underline the necessity for having very current information, but it also suggests the importance of devoting adequate staff resources to keeping the information current.

The two hundred users reported that they called the Green Thumb system on an average of nineteen times per month. It is important to note that computer records only confirm about half that usage. The most frequently accessed information had to do with market and weather data. Researched based information such as agricultural production, advisors represented less than 8 percent of all retrievals in the system. Only about 3 percent of the Green Thumb frames judged by users to be "most useful" were not market and weather frames. In fact even though the users sought out weather and market information more often than any other information, they tended to say that conventional sources of weather and market data (such as radio and television) were more important to them than Green Thumb.

I think it is important to note that there were both large scale and innovative farmers in the 200 user sample as well as some small and part time farmers. It turns out that farmer characteristics made little difference in how frequently a farmer accessed the Green Thumb system. Some have predicted that the advent of computer systems and home terminals will only be beneficial to large scale farming operations. The Green Thumb experience suggests that the

value of agricultural videotext is not restricted only to large scale farmers. Anyone who operates a videotext system should recognize that a variety of needs of different sizes and types of farmers can be met through this system.

About half of the 200 farmers said that they would be willing to pay for a Green Thumb-type videotext system service in the future. The average per month cost that they would be willing to absorb was $18.65. Slightly fewer of the users would be willing to pay a much greater amount, up to $42 a month, for a Green Thumb type system combined with an interactive computer service. One conclusion of the evaluation was that perhaps future systems should should consider these users' interests in computational services for farm business analysis, feed and fertilizer calculations, etc.

The evaluation process asked farmers who had not been participating in the Green Thumb experiment how much they would be willing to pay for such computer services. Those in the Green Thumb experiment would be willing to pay nearly twice as much for future service as those not in the experiment.

In drawing conclusions from the Green Thumb experiment it is important to keep in mind that it was an experiment which users knew from the beginning was available for only a limited period of time. One of the conclusions of Dr. Claude Bennett from the Green Thumb experience is that "the timeliness of the information of any future system must be of primary importance." This may require specialists and agents to devote a significant portion of their time to updating the information. There are cost savings available in terms of mailing costs, printing costs, and travel that help balance the costs of providing such a system. The evaluators emphasized the importance of distinguishing between the roles of the <u>provider</u> of information and of the <u>operator</u> of such a computer system. In the interviews themselves a number of the users suggested that

"extension can provide the objective information" and "private companies can provide the hardware services." One of the Kentucky recommendations was that "extension should further develop and implement extension-oriented Green Thumb type videotext systems with a view toward perhaps eventually turning the service over to the private sector, including cooperatives.

Points to Consider

This overview has been a quick rundown of the Green Thumb system and anyone interested should consult the lengthy reports. From my point of view the lessons to be learned are that caution needs to be exercised in developing information delivery systems. It would be very premature to think that computers will replace our existing strategies. If we refer back to Figure 1, a wholesale move to delivery programs for clientele via computers is still far down the road. In going down that road I think there are a number of issues that we must keep in mind, and I will simply touch on them briefly in this concluding part of my remarks.

In many ways using computers in extension reminds me of the current fad of good news and bad news jokes. The good news about computers as problem solvers is also the bad news. Computers allow us to abstract from reality and represent a set of very complex processes as a set of mathematical equations. For example, we may have a feed rationing program or a farm business analysis program which allows us to summarize data and derive conclusions about feeding practices or about purchases of farm equipment. The bad news, or at least the dangerous news, is that these programs incorporate a theory about how farms work, a set of assumptions that may be more or less correct. These assumptions are pretty well hidden within the computer software. We have to evaluate those assumptions so

that we do not help farmers make mistakes. It may take a lot longer for a farmer to use a pencil and paper to arrive at solutions, but in the process of pushing a pencil the farmer becomes aware of the relationships that are being specified. He can correct various parameters as he goes along; for example, the price of farm inputs or the expected yields. My point is that a world view is built in and that world view can be wrong.

Part of the danger is that, because computers seem mystical and "very scientific," we are likely to believe the results without applying a "common sense" test. We must continually guard against the error that many people make: "if it came from a computer it has to be right." Obviously, the results can be wrong.

I have warned of the dangers of a theory or world view built into computer software. I would like to argue that this very aspect is also part of the good news. Specifying the nature of the relationships among various aspects of a farming operation can help us conceptualize the farm as a system, as a management process. We are led to think about the inter-relationship between costs of inputs and yield, about the implications for pesticide applications for costs and for yields, etc. We can educate ourselves about the nature of the relationships of the whole farming enterprise at the same time that we develop computer models for that enterprise. We are obviously beginning to think this way in many of our Extension programs; and the computer is helping. In recent years we have begun to talk about integrated pest management and integrated reproductive management. We are attempting to combine knowledge from various disciplines into a larger systemic view. One of the great potentials for our mutual education is to think in these larger terms. I think the computer will be an important vehicle for facilitating that thinking.

We must also consider the issues of privacy and security as we develop our computer systems. We do not have time to pursue these issues here, but they should be an important element in our thinking as we put systems in place. Probably each of us has used the electronic mail services in our daily activities. I always wonder about the relative privacy of that mail compared to a sealed envelope. The electronic mail may be faster but it also may be more public. Consider communications between central administration and county extension administrators. We usually do not think of that as being available for everyone in this office. In the commercial electronic mail services security considerations are built in. We need to consider it in our systems. A slightly different but related issue applies to the kind of information that we gather and catalog to evaluate our extension programs. I have mentioned a 4-H record system which will permit analysis of reenrollment, for example. It will require serious policy deliberations as to which information will be useful for program management and development and which constitutes an infringement on the right of privacy of individual 4-H members. There is no right answer to this question but we must consider it.

Joe Coates in his discussion of the assumptions of a futurist pointed out that with the introduction of any new technology, the "side effects dominate." I would like to suggest two side effects, among others, that you may want to consider as we contemplate the movement toward computers in extension. The first side effect is that the nature of our organization will change. Authority relationships and communication patterns will undoubtedly change. When to use computers in extension meant that flow of all electronic communication went through a central university mainframe then, it is my observation, the system became more centralized. However, it may be that with a decentralized system,

with microcomputers in each county office and perhaps on the desk of each staff member, the nature of communications, and indeed, authority relationships may become more decentralized and more diffuse. It will not be necessary for data and contact to flow only through a central computer, but it will be possible to communicate directly with specialists and even directly with information bases outside the state. I will leave it to you to decide if this prediction carries a negative or a positive connotation.

The second side effect that may be related to a decentralization of authority relations has to do with the potential for newer staff within the extension system. I serve on a college extension computer committee in Pennsylvania. I am not yet 40 years old and I am the second oldest member on this committee. The vast majority are young, eager, very capable county staff members. The younger staff are more computer literate than most of us and they are ready to "take off." I find the prospect of our young staff having such an outlet for their knowledge and energy being an exciting and productive possibility for our extension system. It is a way for them to exert some initiative and to excel. While it may be good for the system, it also means that some of us "old timers" may find ourselves taking a back seat.

I don't think it is necessary to take a back seat, however. If I may be so bold as to coin a social law, I would like to suggest that Moore's First Law of Social Dynamics is that "what we don't know is always scary." Some of us are scared of this computer business and a number of our younger colleagues are not. The positive benefits to extension are that the young people can move ahead. The comfort for those of us who don't know about computers is that computers nowadays are "friendly." And with a little bit of effort, the fear will go away and we oldtimers can very quickly quit being scared and be in the middle of

things. Make no mistake, it will take some time from what is already a full schedule. I think it will be worth it.

Concluding Comments

Joe Coates also talked about two alternative orientations toward change in society or within any organization. On the one hand change can be viewed as devastating and repressive and generating a necessity to protect turf. Alternatively, change can be seen as a challenge and an opportunity. I am struck by the fact that Extension has always been a dynamic and changing institution. In fact, those of us who like to study the land grant system find that one of the major problems is that it is moving so fast it is difficult even to describe. The exciting thing about the technological possibilities right now is that they will allow us to make important changes in the system but we must do it consciously and conscientiously. We can make it happen or it will happen to us.

Before us right now is the potential for incorporating into the use of this new technology a vision of a way the organization should work. We have a set of new and exciting tools; what we need is a vision, challenge you to help shape that vision. That vision will require an appreciation for and a familiarity with the new technology. More importantly, it will require a vision of society and Extension and the landgrant's role in that society in the future. I hope that that vision for you will be more than just the machines. In fact it will include some version of the set of pictures or images I carry around with me. The first image is of a farmer coming to the door at our house when I was barely able to see out the front door. The farmer clearly had not shaved for a couple days and more importantly I remember the tears running down his cheeks as he gave my father a hug for helping him save his corn crop. It is difficult to give a computer a hug.

Another image that I have is of the young girl that I helped learn to block a lamb. I was back at the county fair four years later as this young woman won the showmanship contest. She came up to me and gave me a hug and said, "I was just elected president of my sophomore class. You don't know it but you helped me do that when you helped me gain self confidence." Finally, this past month I was at the oversight hearings for the Cooperative Extension Service in Washington, D.C. I heard a woman from the Midwest begin her testimony by saying "I went to a homemakers club in my community and was scared to death when I had to give a committee report. Then I was elected an officer in the county homemakers club and was scared to death the first time I had to stand before them. I then became an officer in the state homemakers club and was scared to death when I had to make a speech before the state organization. Now I am sitting in front of a Congressional hearing and I am scared to death. But because extension has provided me these opportunities to grow, I know I can do it."

These three images remind me that Extension is about helping people and really not about technology. Technology is the vehicle by which we help people solve problems. I have heard it said that our clientele is demanding computers. I really don't believe they are demanding computers. Rather I think they are demanding help in solving problems and they think computers are an appropriate tool. Our job is to understand those people, to understand their problems, and to provide them with information through which they can gain enough confidence to make decisions. Let's not forget the people.

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